Chemistry
Z
7913
.U58

U. S. Government

RESEARCH REPORTS

November 20, 1961
Vol. 36, No. 10

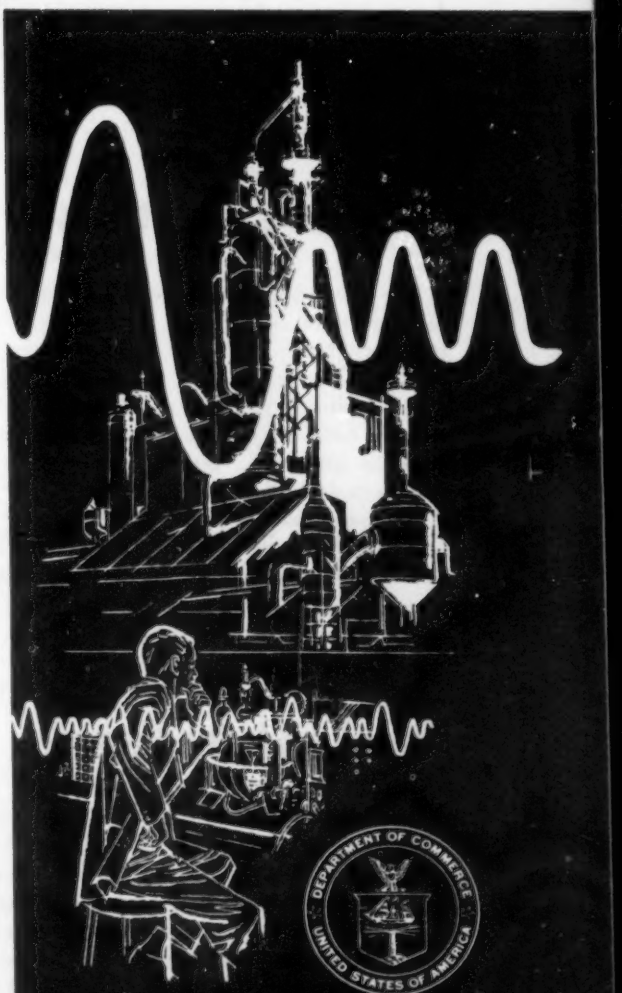
. . available to science and industry.

UNIVERSITY OF MICHIGAN
NOV 22 1961
CHEMISTRY LIBRARY

The reports listed in this publication, unless otherwise noted, are available from the Office of Technical Services, U.S. Department of Commerce, at the prices indicated. They may also be ordered through Department of Commerce Field Offices.

The Office of Technical Services collects and distributes the research and development reports of the Army, Navy, Air Force, Atomic Energy Commission, and other agencies of the Federal Government for the use of private scientific and industrial firms and organizations in the development of new products and processes and in making technological improvements.

This publication is issued twice a month to announce new material available through the Office of Technical Services, which sells copies of Government reports at the cost of reproduction and handling. For additional information and ordering instructions, see inside of front cover.



U. S. DEPARTMENT OF COMMERCE
BUSINESS AND DEFENSE SERVICES ADMINISTRATION
Office of Technical Services

U.S. GOVERNMENT RESEARCH REPORTS

U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, *Secretary*

BUSINESS AND DEFENSE SERVICES ADMINISTRATION
Thomas E. Dramm, Jr., *Administrator*

Office of Technical Services
John C. Green, *Director*

Issued twice a month. Annual subscription $15 ($3.75 additional for foreign mailing). Single copy $1. Make remittance payable to Superintendent of Documents and mail either to a U.S. Department of Commerce Field Office or to Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Address changes should be sent to Superintendent of Documents.

Contents may be reprinted freely. Mention of source will be appreciated.

Use of funds for printing this publication approved by the Director of the Bureau of the Budget, June 30, 1961.

U.S. Government Research Reports

This publication is issued twice a month to announce new reports of research and development released by the Army, Navy, Air Force, Atomic Energy Commission, and other agencies of the Federal Government. Unless otherwise indicated, reports listed are available from the Office of Technical Services. Some are reproduced by photo-offset printing, others by photocopy reproduction.

The first section of *U.S. Government Research Reports* is compiled by the Armed Services Technical Information Agency and is called "Technical Abstract Bulletin." (ASTIA is a Department of Defense agency which services DOD agencies and their contractors with military research information.) The next section is called "Non-Military and Older Military Research Reports." Here are listed new reports of the Atomic Energy Commission, the Office of Saline Water of the Department of Interior, and reports of other civilian agencies of the Government. In addition, this section lists military research reports not to be found in the "TAB." Most of these older military reports have been acquired by OTS in response to specific industry requests.

How To Order Reports

Almost all reports listed in *U.S. Government Research Reports* are available from the Office of Technical Services, U.S. Department of Commerce, Washington 25, D.C., or may be ordered through any Department of Commerce Field Office. Prices are given with each entry. Please use the identification numbers (AD number, PB number, AEC series number) and titles of reports when ordering. Prepayment is required. When any report is not available from OTS but from another source, the name and address of that source will be given. Direct your order to that address and not to OTS.

MICROFILM—Any reports available from the Office of Technical Services will be provided in microfilm (35 mm.) on request. The following prices are charged for microfilm: 1 through 20 pages, 80 cents minimum; and 3 cents per page for every page in excess of 20 pages.

CONTENTS

Div.		Page
	INTRODUCTION	ii
1	AIRCRAFT AND FLIGHT EQUIPMENT	1
2	ASTRONOMY, GEOPHYSICS, AND GEOGRAPHY	4
3	CHEMICAL WARFARE EQUIPMENT AND MATERIALS	12
4	CHEMISTRY	12
5	COMMUNICATIONS	16
6	DETECTION	17
7	ELECTRICAL EQUIPMENT	18
8	ELECTRONICS AND ELECTRONIC EQUIPMENT	21
9	FLUID MECHANICS	35
10	FUELS AND COMBUSTION	41
11	GROUND TRANSPORTATION EQUIPMENT	44
12	GUIDED MISSILES	45
13	INSTALLATIONS AND CONSTRUCTION	51
14	MATERIALS (NON-METALLIC)	52
15	MATHEMATICS	54
16	MEDICAL SCIENCES	58
17	METALLURGY	64
18	MILITARY SCIENCES AND OPERATIONS	67
19	NAVIGATION	67
20	NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY	68
21	NUCLEAR PROPULSION	71
22	ORDNANCE	71
23	PERSONNEL AND TRAINING	74
24	PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES	76
25	PHYSICS	77
26	PRODUCTION AND MANAGEMENT	92
27	PROPULSION SYSTEMS	93
28	PSYCHOLOGY AND HUMAN ENGINEERING	96
29	QUARTERMASTER EQUIPMENT AND SUPPLIES	98
30	RESEARCH AND RESEARCH EQUIPMENT	100
31	SHIPS AND MARINE EQUIPMENT	107
32	MISCELLANEOUS ARTS AND SCIENCES	108
33	TRANSPORTATION	109
	AD INDEX	S-77

CONTENTS

	Page
INTRODUCTION	iii
1 AERONAUTICS AND FLIGHT EQUIPMENT	1
2 ASTRONOMY, GEODETICS, AND GEOGRAPHY	12
3 CHEMICAL WARFARE EQUIPMENT AND DETECTORS	12
4 CHEMISTRY	16
5 COMMUNICATIONS	17
6 DETECTION	18
7 ELECTRICAL EQUIPMENT	21
8 ELECTRONICS AND ELECTRONIC EQUIPMENT	22
9 FLUID MECHANICS	32
10 FUELS AND COMBUSTION	40
11 GROUND TRANSPORTATION EQUIPMENT	43
12 GUIDED MISSILES	51
13 METALLURGY AND CONSTRUCTION	59
14 MATERIALS NON-METALLIC	74
15 MATHEMATICS	78
16 MEDICAL SCIENCES	82
17 METALLURGY	87
18 MILITARY SCIENCES AND OPERATIONS	90
19 NAVIGATION	94
20 NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY	96
21 NUCLEAR PROPULSION	111
22 OPTICS	114
23 PERSONNEL AND TRAINING	122
24 PHOTOGRAPHY AND OTHER REPRODUCTION	126
25 PHYSICS	127
26 PRODUCTION AND MANUFACTURE	132
27 PROPULSION SYSTEMS	134
28 BIOLOGY AND HUMAN ENGINEERING	138
29 QUARTERMASTER EQUIPMENT AND SUPPLIES	150
30 RESEARCH AND DEVELOPMENT	157
31 SHIPS AND MARINE EQUIPMENT	159
32 SPECIALTIES AND MISCELLANEOUS	160
33 TRANSPORTATION	169
AD INDEX	S-29

How To Order Reports

CONTENTS (CON.)

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

	Page
BIBLIOGRAPHY	S-1
BEHAVIORAL SCIENCES	S-1
BIOLOGICAL SCIENCES	S-4
CHEMISTRY	S-6
EARTH SCIENCES	S-12
ENGINEERING	S-14
FOOD, HANDLING, AND PACKAGING EQUIPMENT	S-31
MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT	S-32
MATERIALS	S-33
MATHEMATICS	S-37
MECHANICS	S-40
METALLURGY	S-45
NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY	S-48
PERSONNEL SUPPLIES AND PERSONAL EQUIPMENT	S-58
PHYSICS	S-59
RESEARCH METHODS, TECHNIQUES AND EQUIPMENT	S-72
SOCIAL SCIENCES	S-75
MISCELLANEOUS	S-76
NUMBER INDEX	S-79

THIS ISSUE INCLUDES:

TAB 61-4-4
AD 262300 - AD 263099

TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-262 465 Div. 1, 2
(6 Sep 61) OTS price $21.00

Booz-Allen Applied Research, Inc., Chicago, Ill.
THE DOMAIN OF THE GROUND EFFECT MACHINE. VOLUME I. THE DETERMINATION OF PHYSICAL AND OPERATING CHARACTERISTICS OF MILITARY OVERLAND, AMPHIBIOUS AND MARINE GEMS FROM WORLD-WIDE ENVIRONMENTAL CRITERIA.
Aug 61, 384p. incl. illus. tables, 67 refs.
(Contract Nonr-337500)

Unclassified report

DESCRIPTORS: *Ground effect, *Vehicles, *Flying platforms, *Military operations, Military transportation, Military equipment, Geography, Oceanographical data, Terrain, Meteorology, Asia, Europe, Africa, South America, North America, Climatic factors, USSR.

The total environmental aspects of Ground Effect Machines (GEM) operated on a world-wide basis are examined in detail. The natural environment describing terrain, beaches, sea states and climate; the induced environment covering noise, spray and vibration; and the combat environment including vulnerability, infrared emanation and radar reflectivity are investigated sufficiently to determine their influence on the basic design requirements and operational parameters of the over-all GEM system. Within the framework of the natural environmental elements a classification of GEM is developed. This classification covers marine, overland, and amphibious GEM operations. In each of these categories vehicle sizes and operating heights and areas of utilization are included. For all classes of GEM the specific effects of the induced and combat environments are discussed. Finally, typical performance capabilities and equipment requirements based on the total operating environment are developed for each class of GEM. (Author)

AD-262 540 Div. 1, 2, 14
(6 Sep 61) OTS price $6.60

Kaysam Corp. of America, Paterson, N. J.
STUDY OF PHYSICAL AND CHEMICAL CHARACTERISTICS OF BALLOONS AND BALLOON MATERIALS.
Quarterly progress rept. no. 5, 25 Apr-24 July 61, by Eric Nelson, ed. by John Kantor. 24 July 61, 65p. incl. tables (Rept. no. 5)
(Contract DA 36-039-sc-84925, Proj. 3A99-07-001-08; Continuation of Contract DA 36-039-sc-72386)

Unclassified report

DESCRIPTORS: *Meteorological balloons, Materials, *Elastomers, Physical properties, Chemical properties, Polymers, Balloons, Plasticizers, Films, High altitude, Flight testing, Ozone, Radiation damage, Infrared radiation, Ultraviolet radiation, Design, Configuration, Aerodynamic configuration, Construction, Meteorology, Synthetic rubber, Preparation, Processing, Antioxidants.

Progress is reported on the study of balloon films and their effect on balloon flight performance. Mobilsol L was inferior to dibutyl sebacate and butyl oleate. Butoxy ethyl oleate was almost identical to Paraflux C-325. Poly-isoprene latex proved to be unstable, to have poor wet gel strength, and to be unsuitable as a balloon material. Neoprene 400 was incorporated into a compound with desirable properties at all temperatures. Detailed study of the behavior of balloon films in ozone clearly indicated that the type of compound, degree of elongation, and nature of the extension of the balloon films are all significant. Flights of two-piece, streamlined balloons with a lower modulus carrier balloon than previously used were still slower than is desirable. (Author)

AD-262 717 Div. 1, 12
(11 Sep 61) OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
THE PITCH-YAW-ROLL COUPLING PROBLEM OF GUIDED MISSILES AT HIGH ANGLES OF PITCH,
by Gerald Corning. July 61, 15p. incl. illus.
(NAVWEPS rept. no. 7383)

Unclassified report

DESCRIPTORS: *Aerodynamics, *Guided missiles, Yaw, Roll, Moments, Vortices, Design, Couplings, Control surfaces, Guidance, Fins, Stabilizers (Horizontal tail surface), Pitch, Deflection.

A study has been made of the pitch-yaw-roll coupling problem to determine: (a) how the problem arises, (b) the general effects of this coupling on the flight of missiles, and (c) how the adverse effects of the coupling can be minimized. The coupling results primarily from the fact that at high angles of attack, the pressure on the windward side of the missile is greater than on the lee side. For equal deflections of the vertical control surfaces, the surface on the windward side will produce a higher force than the one on the lee side, thereby producing a rolling moment as well as a side force. In addition, when the angle of pitch and the angle of roll are not equal to zero, the vortices from the fuselage nose introduce control surface forces in such a manner as to cause a rolling moment, which also affects the coupling. The general effects of this coupling have been to render some missiles uncontrollable under certain conditions of angle of pitch and Mach number, and other missiles to become merely more difficult to control precisely. These adverse effects may be minimized by proper guidance systems and aerodynamic design. (Author)

AD-262 769 Div. 1, 16, 19, 33
(13 Sep 61) OTS price $2.50

Federal Aviation Agency, Washington, D. C.
APPROACH VISIBILITY STUDIES AT NEWARK.
Final rept.,
by William E. Eggert. Sep 60, 112p. incl. tables.
(Proj. D-1-902)

Unclassified report

Division 1 - AIRCRAFT AND FLIGHT EQUIPMENT

DESCRIPTORS: *Visibility, Visual perception, Light adaption, Night landing, *Approach lights, *Approach indicators, Clouds, Safety, Measurement.

The development of equipment and techniques for determining a pilot's slant visual range in the approach zone under instrument landing conditions was investigated. Resulting from these studies is a method of determining and expressing in the form of probabilities slant visibility in terms of height on the glide slope at which a pilot on an instrument approach would first establish visual contact with the approach light system, the Approach Light Contact Height (ALCH). This report presents a detailed analysis of 2375 instrument approaches. Conventional type aircraft were used to participate during the project. Data from pilot reports of establishing contact during an instrument approach was based upon his sighting of centerline Configuration A high intensity approach lights in contrast to earlier studies in which sighting of runway threshold lights of lower effective intensities were used. Based upon this later data, earlier empirical relationships between the measured meteorological quantities and the approach light contact height have been redefined and simplified. New constants have been derived. A complete description of the basis of the method is presented together with an evaluation of the operational applications of the information as pilot advisory data, as a basis for legal landing minimums, and as a missed approach probability indicator. (Author)

AD-262 976 Div. 1
(6 Sep 61) OTS price $3.60

Boeing Co., Seattle, Washington.
DYNA-SOAR EJECTION SEAT AND SURVIVAL SYSTEM.
1961, 34p. incl. illus.
Unclassified report

DESCRIPTORS: *Ejection seats, *Survival kits, Design, Effectiveness, Test methods, *Tracks (Aerodynamics), Packaging, *Jettisonable equipment, Parachutes, Catapults, Tests, Temperature, Vibration, Reliability, Production.

A study was made of the design, fabrication, performance and testing requirements for an ejection seat and survival system. The equipment was designed to provide for pilot escape and survival from the Dyna-Soar glider. Preproduction tests were made of ejection seat and rail assemblies, rocket catapult and parachute assemblies, reserve and survival kits, and packaging for reliability, and for compliance with military specifications. Temperature and vibration and environmental tests were also made.

AD-263 004 Div. 1, 14
(15 Sep 61) OTS price $5.60

Goodyear Aircraft Corp., Akron, Ohio.
AIRMAT MATERIALS INVESTIGATION OF ONE-PLACE INFLATOPLANE GA-468.
30 June 61, 57p. incl. illus. tables. (Rept. no. GER-10270)
(Contract Nonr-236800)
Unclassified report

DESCRIPTORS: *Airplanes, Fuselages, Wings, Materials, Synthetic fibers, Synthetic rubber, Buoyant materials, Textiles, Nylon, Elastomers, Resins, Laminates, Test methods, Tests, Failure (Mechanics), Life expectancy, Physical properties, Packaging, Handling, Storage, Pneumatic devices, Pressure, Pressure vessels.

Airmat cockpit, wing, and empennage surface materials were given rotoflex, creasing, permeability, tear strength, cyclic loading, and cylinder elongation tests. Wing surface materials and drop threads were given quick break, dead load-time and panel burst tests. Most specimens were fabricated of Airmat vehicle materials more than 4 years old. The ability of the material to withstand mechanical abuse was substantiated; dead load and panel burst tests indicated strength degradation with age and use. The Inflatoplane service life is calculated as being a minimum of 12,000 hr. Hydrogen permeability increased after application of a cyclic load of 10,000 cycles by a factor of 3 to 5 for the cockpit and empennage; by a factor of 10 for the wing material; it did not increase noticeably thereafter up to 100,000 cycles. Rotoflexing and creasing reduced material strength by 2 to 5% for the cockpit and empennage and 7% for the wing.

AD-263 043 Div. 1
(18 Sep 61) OTS price $3.60

Air Force Flight Test Center, Edwards Air Force Base, Calif.
DEVELOPMENT OF THE NON-FRANGIBLE WHEEL FOR B-58 AIRCRAFT,
by James A. Ford and Fitzhugh L. Fulton, Jr.
June 61, 28p. incl. illus. tables (AFFTC TR 61-33)
Unclassified report

DESCRIPTORS: *Aircraft tires, *Landing gear, Bearings, Friction, Heat, Shock, Test methods, Tests, Skid indicators.

This report presents the results of testing a non-frangible wheel assembly which was installed on a B-58 aircraft. The purpose of the test was to develop a wheel configuration capable of performing under maximum gross weight hot day take-off conditions with blown tires. Fifteen taxi runs plus a take-off and landing were conducted between 21 December 1960 and 28 February 1961. The final wheel configuration as developed during these tests is suitable for an emergency take-off in the event of tire failure. However, outboard wheel bearing seals must be improved to consistently retain the bearing lubricant. (Author)

AD-263 047 Div. 1
(18 Sep 61) OTS price $5.60

Air Force Flight Test Center, Edwards Air Force Base, Calif.
B-58A HEAVY WEIGHT TAKE-OFF REFUSALS,
by Robin K. Ransone and Fitzhugh L. Fulton, Jr.
Aug 61, 53p. incl. illus. tables. (AFFTC TR 61-14)
Unclassified report

DESCRIPTORS: *Jet bombers, *Take-off, Reliability, Hydraulic brakes, Air brake flaps, Landing gear, Tests, Test methods, Drag, *Deceleration, Parachutes.

A series of eleven refused take-offs were conducted to obtain refused take-off performance data for the B-58 Flight Manual at the design limit capability of the aircraft tires, wheels, and brakes, and to determine and demonstrate the most effective stopping technique. The highest brake energy level demonstrated during this program was a take-off refusal which generated 16.8 million of the maximum allowable 18 million foot-pounds of energy in each brake. The test day distance required to accelerate to 160 knots IAS, refuse, and stop without the aid of a drag chute was 13,440 feet. Gross weight at brake

release was 163,000 pounds. Pressure altitude was 2260 feet and ambient temperature was 61 degrees F with no wind. Although brake shuttle valve failure caused minor wheel fires at the end of this run, performance of the tires, wheels and brakes was considered generally satisfactory. Minimum stopping distances for the B-58A for speeds at or below the brake limit speed are obtained by maximum use of the mechanical brakes and drag chute with the aircraft in a three point attitude. Aerodynamic braking, which is achieved by rotating the aircraft to the most nose high attitude which aircraft geometry will allow, is an effective means of decelerating the airplane and should be used in conjunction with the drag chute to decelerate the aircraft to the brake limit speed. (Author)

AD-263 053 Div. 1, 28
(18 Sep 61) OTS price $2.50

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
EVALUATION OF AIRPORT NOISE AND COMMUNITY REACTION.
Sep 60, 112p. incl. illus. tables, 47 refs.
(Contract FAA/BRD-15)
Unclassified report

DESCRIPTORS: *Airports, *Airplane noise, *Psychoacoustics, Acoustic insulation, Airplane landings, Take-off, *Jet plane noise, Intensity, Attenuation, Measurement, Analysis, Theory.

A study of aircraft noise and community reaction is described. Two basic kinds of information were examined, the first relating to the characteristics of the noise received on the ground due to flying aircraft and the second relating to the human perception of and response to such noise. Blast fences used by the Air Force and by other jet aircraft operators have been designed and used primarily for the purpose of protecting property and personnel from the effects of jet exhaust. Such fences also may attenuate the noise from engine run-up, but they must be suitably positioned behind the aircraft. Furthermore, as the aircraft moves away from the fence the attenuation will be reduced. Tests should be made to verify the predicted theoretical attenuation and to find the most effective configuration before a general program of fence installation is started. The effects of dense vegetation also require further testing. The available data, which are considered to be optimistic for the run-up situation, indicate that at least 300-500 feet of dense vegetation is required for appreciable reduction of aircraft noise. (Author)

AD-263 075 Div. 1, 9
(18 Sep 61) OTS price $1.00

National Aeronautics and Space Administration, Washington, D. C.
FREE-FLIGHT INVESTIGATION OF RADIO-CONTROLLED MODELS WITH PARAWINGS,
by Donald E. Hewes. Sep 61, 32p. incl. illus.
(NASA Technical note no. D-927)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note no. D-927.

DESCRIPTORS: *Airplane models, Stability, Control, *Gliders, Wind tunnel models, Flight testing, Stability (Lateral), Stability (Longitudinal), Triangular wings, Swept-back wings, Aerial rudders, Control surfaces, Radio, *Control systems, Remote control systems.

A free-flight investigation of two radio-controlled models with parawings, a glider configuration and an airplane (powered) configuration, was made to evaluate the performance, stability, and methods of controlling parawing vehicles. The flight tests showed that the models were stable and could be controlled either by shifting the center of gravity or by using conventional elevator and rudder control surfaces. Static wind-tunnel force-test data were also obtained. (Author)

AD-263 077 Div. 1
(18 Sep 61) OTS price $.75

National Aeronautics and Space Administration, Washington, D. C.
A SIMULATOR STUDY OF THE EFFECTIVENESS OF A PILOT'S INDICATOR WHICH COMBINED ANGLE OF ATTACK AND RATE OF CHANGE OF TOTAL PRESSURE AS APPLIED TO THE TAKE-OFF ROTATION AND CLIMBOUT OF A SUPERSONIC TRANSPORT,
by Albert W. Hall and Jack E. Harris. Sep 61, 26p. incl. illus. (NASA Technical note no. D-948)
Unclassified report

Also available from NASA, Wash. 25, D. C. as NASA Technical note no. D-948.

DESCRIPTORS: *Flight instruments, *Angle of attack indicators, Airspeed indicators, Effectiveness, Tests, Flight simulators, Transport planes, Turbojet engines, Safety, *Supersonic flight, Take-off, Rotation, Turbulence, Stability, Control, Simulation.

A simulator study has been made to determine the effectiveness of a single instrument presentation as an aid to the pilot in controlling both rotation and climbout path in take-off. The instrument was basically an angle-of-attack indicator, biased with a total-pressure-rate input as a means of suppressing the phugoid oscillation. Linearized six-degree-of-freedom equations of motion were utilized in simulating a hypothetical supersonic transport as the test vehicle. Each of several experienced pilots performed a number of simulated take-offs, using conventional flight instruments and either an angle-of-attack instrument or the combined angle-of-attack and total-pressure-rate instrument. The pilots considered the combined angle-of-attack and total-pressure-rate instrument a very effective aid. Even though they could, with sufficient practice, perform satisfactory climbouts after simulated engine failure by monitoring the conventional instruments and making corrections based on their readings, it was much easier to maintain a smooth flight path with the single combined angle-of-attack and total-pressure-rate instrument. (Author)

Division 2 - ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-262 317 Div. 2
(31 Aug 61) OTS price $3.60

Naval Postgraduate School, Monterey, Calif.
AN INVESTIGATION OF SEMI-DIURNAL FLUCTUATIONS OF WINDS AT AN ALTITUDE OF TEN KILOMETERS,
by Richard S. Downey. 1961, 25p. incl. illus. tables.
Unclassified report

DESCRIPTORS: *Wind, Diurnal variations, Measurement, Determination, Weather stations, Recording devices, Statistical analysis, Northern hemisphere, Climatic factors, Atmosphere, Theses.

The 10-km winds during a 100-day period from 1 November 1959 through 8 February 1960 observed at 15 stations were extracted from the Northern Hemisphere Data Tabulations. Nine of these stations recorded the 10-km wind at 0000Z, 0600Z, 1200Z, and 1800Z with reasonable regularity each day. The other six stations observed the 10-km wind at 0000Z and 1200Z only. As a maximum of only four observations per day presents considerable impediment to satisfactory analysis of a semi-diurnal oscillation, the stations were selected in a spatial relationship designed to indicate the wavelength of the oscillation. Also a period was chosen to provide relative constancy of certain solar tidal parameters. The period selected is symmetrical to the northern hemisphere winter - the sun's declination progressing from about 15 degrees south on 1 November through the solstice on 22 December and back to about 15 degrees south on 8 February. The location of the stations was such that they extended over about 180 degrees of longitude with the goal of encompassing spatially one complete semi-diurnal wave. (Author)

AD-262 318 Div. 2
(31 Aug 61) OTS price $3.60

Naval Postgraduate School, Monterey, Calif.
A STUDY OF THE TIME VARIATION OF PERTURBATION KINETIC ENERGY AT THE 500-MILLIBAR LEVEL.
Master's thesis,
by William F. Cross. 1961, 31p. incl. illus. tables.
Unclassified report

DESCRIPTORS: *Atmosphere, *Barometric pressure, Kinetic theory, Energy, Harmonic analysis, Integration, *Transport properties, *Wind, Shear stresses, Northern hemisphere, Tables, Frequency, Periodic variations, *Theses.

The transfer of kinetic energy by individual wave numbers is computed at various latitudes using data obtained from a harmonic analysis of the hemispheric 500 millibar pressure height. Linear correlations are sought between the computed values of kinetic energy transfer and computed 24-hour changes of kinetic energy of the perturbations for the same and for adjacent wave numbers. (Author)

AD-262 319 Div. 2
(31 Aug 61) OTS price $6.60

Naval Postgraduate School, Monterey, Calif.
THE INFLUENCE OF WINDS AND RELATIVE HUMIDITY ON THE SEASONAL THERMOCLINE AT OCEAN STATION P.
Master's thesis,
by Marion J. Clark. 1961, 56p. incl. illus. tables.
Unclassified report

DESCRIPTORS: *Wind, *Humidity, Periodic variations, Temperature, Climatic factors, Oceanographical data, *Oceans, *Convection, Atmosphere, Heat transfer, *Weather forecasting, Theses, Marine Meteorology, Statistical analysis.

Interest was focused on obvious surface meteorological parameters, such as air-sea temperature difference and wind speed. Attention was directed to the higher atmospheric layers and such significant conditions aloft which may possibly be associated with variations in the temperature structure in the ocean. Primary interest was in the onset and initial disturbances or sinkings of the newly-established seasonal thermocline at ocean station P (latitude 50N, longitude 145W). One of the main objectives is to detect significant meteorological changes or disturbances in the state of the atmosphere which accompany or precede distinct variations in the thermocline; and to take advantage of these atmospheric changes as possible forecasting tools to predict the temperature structure of the upper layers of the ocean or the depth of the mixed layer. (Author)

AD-262 320 Div. 2
(31 Aug 61) OTS price $4.60

Naval Postgraduate School, Monterey, Calif.
A NUMERICAL METHOD OF 1000-MB PROGNOSIS THROUGH PREDICTION OF THICKNESS FIELD.
Master's thesis,
by Ho-Chih Chin, Chuang-Tao Kuan, and Ha Song Pak. 1961, 38p. incl. illus. tables.
Unclassified report

DESCRIPTORS: *Atmosphere models, *Barometric pressure, Thickness, Terrain, Heating, Heat transfer, Atmosphere, Density, Weather forecasting, Theses, Meteorological data, Programming, Digital computers, Mathematical prediction, Northern hemisphere, Meteorological charts.

A two-level numerical prediction model incorporating terrain and non-adiabatic warming effects is tested. An attempt is made to determine the empirical coefficient(s) for each of three terms composing a prognostic equation designed to predict the 1000- to 500-mb thickness through the use of a digital computer. The model is applied to three cases in April for a large part of the Northern Hemisphere. The predicted positions of most of the pressure systems were reasonably accurate; however the model tends to over-develop pressure centers. The effects of terrain and non-adiabatic warming were in accord with theoretical expectations; however, the excessive development dominated the numerical verification so that no significant improvement resulted from the inclusion of these refinements. (Author)

AD-262 321 Div. 2
(31 Aug 61) OTS price $3.60

Naval Postgraduate School, Monterey, Calif.
A STUDY OF GEOSTROPHIC ANGULAR MOMENTUM TRANSPORT BY WAVES WITH PERIODS 1 TO 30 DAYS AT THE 500-MB SURFACE AND A MID-LATITUDE STATION.
Master's thesis,
by Carl E. Blaes. 1961, 25p. incl. illus.
Unclassified report

DESCRIPTORS: *Wind, Measurement, Velocity, Oscillation, Motion, Gas flow, *Atmosphere, Northern hemisphere, Weather forecasting, Spectrographic analysis, Tables, Frequency, Meteorology, Periodic variations, Energy, Kinetic theory, Integration, *Transport properties, *Theses.

The winter-time transport of geostrophically computed angular momentum at 500 mb for the period 1 December 1955 to 28 February 1956 is obtained for Sault Ste. Marie, Michigan. This transport is subjected to a cospectral analysis to compute the contribution of harmonic waves with periods 1 - 30 days to the total angular momentum transport. Computations are made for two other stations, one east, and one south of Sault Ste, Marie for comparison of transport as related to general circulation processes. (Author)

AD-262 322 Div. 2
(31 Aug 61) OTS price $3.60

Naval Postgraduate School, Monterey, Calif.
THE EFFECT OF WIND UPON THE MIXED-LAYER DEPTH.
Master's thesis,
by Jack E. Geary. 1961, 28p. incl. illus. tables.
Unclassified report

DESCRIPTORS: *Atmosphere models, *Wind, Ocean waves, Weather stations, Oceans, Surface properties, *Ocean currents, *Heat transfer, Convection, *Weather forecasting, Theses, Marine meteorology, Northern hemisphere, Surface temperatures, Mathematical analysis.

The general problem of the mixed-layer depth of the ocean's surface layers is discussed. Wind mixing and its contribution to mixed-layer depth at ocean station Papa during the year 1958 is evaluated. A model of mixing by wind-generated wave motion is tested along with two other models, and the results are discussed. (Author)

AD-262 323 Div. 2
(31 Aug 61) OTS price $2.60

Naval Postgraduate School, Monterey, Calif.
INVESTIGATION OF STREAM FUNCTIONS OBTAINED THROUGH SECOND-ORDER GEOSTROPHIC APPROXIMATIONS.
Master's thesis,
by Mildred J. Frawley. 1961, 22p. incl. tables.
Unclassified report

DESCRIPTORS: *Air, *Wind, Deflection, Partial differential equations, Gas flow, Velocity, Acceleration, Atmosphere models, Vortices, *Atmosphere, *Weather forecasting, Errors, Barometric pressure, *Meteorology, Theses, Functions.

Using the geostrophic approximation in various of the horizontal acceleration terms in the Eulerian equations for horizontal flow, wind components are computed from which relative vorticity is determined. The problem of obtaining a stream function is then reduced to solving a Poisson-type equation, thus avoiding the use of the balance equation. Two different computation schemes for the x, y components of the 500-mb wind are investigated. The stream functions obtained from these methods are then compared with those obtained through the solution of the balance equation. The results of forecasts for 24 and 48 hours using the various stream functions with the barotropic model are also presented. (Author)

AD-262 325 Div. 2
(31 Aug 61) OTS price $5.60

Naval Postgraduate School, Monterey, Calif.
METEOROLOGICAL FACTORS AFFECTING MIXED-LAYER DEPTH FLUCTUATION,
Master's thesis,
by Ralph A. Zettel. 1961, 45p. incl. illus. tables, 12 refs.
Unclassified report

DESCRIPTORS: *Weather forecasting, Theses, Marine meteorology, *Ocean currents, *Heat transfer, Convection, Periodic variations, Surface temperature, Weather stations, Oceans, Pacific Ocean, Climatic factors, Statistical analysis.

The general problem of modification of the ocean's thermal structure by meteorological influences is discussed. Meteorological factors associated with mixed-layer depth fluctuation at three ocean stations in the open Pacific Ocean are evaluated and discussed. Sea-surface temperature correlation with mixed-layer depth at ocean station PAPA to support the meteorological influence is also evaluated and discussed. (Author)

AD-262 326 Div. 2
(31 Aug 61) OTS price $5.60

Naval Postgraduate School, Monterey, Calif.
A METHOD OF FORECASTING THE FORMATION OF 500-MILLIBAR BLOCKS USING STATISTICAL PARAMETERS.
Master's thesis,
by Arthur N. Hull. 1961, 40p. incl. illus. tables, 12 refs.
Unclassified report

DESCRIPTORS: *Weather forecasting, *Barometric pressure, *Statistical analysis, Meteorology, Pressure, Theses, Arctic regions, Tables.

An investigation is made of the statistical properties of blocks at the 500-mb level along the latitude belt 50-55N covering 180 degrees of longitude including the block area. From the results obtained a method of computing a 72-hour forecast of block formation is developed. From the space correlations in SSW (Selfridge, S., N. Stevenson, and E. Wood, The development of a weather-typing system for extended-range forecasting. Master's Thesis, U. S. Naval Postgraduate School, 155pp., 1960) the expected frequency of block days in all four sectors which they investigated is 903 block days out of a possible 2168 days. Of these block days, 209 were initial formation days. The remaining block days were rejected from the total, since only initial block days and non block days were used in testing. The climatological expectancy of block formation was 0.142 per day. The climatological expectancy of non block days was considered to be 1-0.142 equals 0.858. From the sample summarized, a forecast accuracy of 87 percent and a skill score, based on the climatological expectancies, of 0.73 were obtained.

AD-262 327 Div. 2
(31 Aug 61) OTS price $2.60

Naval Postgraduate School, Monterey, Calif.
OCEANOGRAPHIC EFFECTS OF THE BERMUDA-AZORES ANTICYCLONE.
Master's thesis,
by William Stevens. 1961, 19p. incl. illus. 14 refs.
Unclassified report

DESCRIPTORS: *Anticyclones, *Oceanography, *Bermuda, *Azores, Gulf Stream, Ice, Florida, South Carolina, Wind, Theses, Meteorology, Marine meteorology, Jet streams (Meteorology).

The monthly values of a function which measures the Ekman drift across a portion of the Gulf Stream near the Florida-South Carolina coast are computed. The function depends upon geostrophic winds which are obtained from monthly mean surface weather maps. The values are compared with the secular variation of the areal ice extent in the Barents Sea, the annual variation of sea level along the Florida-South Carolina coast, and the annual variation of Gulf Stream surface velocity in the same area. Results indicate that the variation of these winds off the south-east coast of the United States is an important factor in the determination of ice extent in the Barents Sea, that these winds have a minor influence on the annual variation of local sea level, and that they are highly correlated with the annual variation of local Gulf Stream velocities. (Author)

AD-262 328 Div. 2
(31 Aug 61) OTS price $4.60

Naval Postgraduate School, Monterey, Calif.
RATIOS OF GEOSTROPHIC DRAG COEFFICIENTS IN THE SURFACE LAYER UNDER VARIOUS STABILITY CONDITIONS.
Master's thesis,
by Soewarso. 1961, 38p. incl. illus. tables.
Unclassified report

DESCRIPTORS: Boundary layer, *Wind, *Turbulent boundary layer, *Atmosphere, Meteorology, Drag, Turbulence, Theses, Stability, Shear stresses, Mathematical analysis, Tables.

The ratio of geostrophic drag coefficients C/C(a) under various stability conditions is obtained as a function of Richardson number. A drag coefficient C(f) is defined in relation to the mechanical mixing length, and its ratio to the actual drag coefficient C is related to the Richardson number. By using observational recent data on the normalized logarithmic wind shear of Monin-Obukhov one can obtain ((f)/C(a)). (Author)

AD-262 393 Div. 2
(11 Sep 61) OTS price $1.10

American Meteorological Society, Boston, Mass.
AIR COOLING AND CONDENSATION DURING HEAT ADVECTION (Okhlazhdenie Vozdukha i Kondensatsiia pri Advektsii Tepla),
by A. N. Mertsalov, tr. by Richard M. Holden.
Mar 61, 5p. incl. illus. tables (Trans. no. T-R-352 of Meteorologiia i Gidrologiia 11:58-60, 1959)
(Contract AF 19(604)6113)
Unclassified report

DESCRIPTORS: Meteorological data, Precipatation, Dew point, Temperature, *Heat transfer, Convection, *Condensation, Atmosphere, Cooling, Tables, USSR.

Tables are given which are useful not only for cases of heat advection but also for other cases of nonadiabatic air temperature changes. The cause of condensation does not play a role in this case. In particular, condensation and even slight precipitation can evidently be caused by nocturnal radiation (if the air is saturated by water vapor over a sufficiently great distance) and also by the interdiurnal transformational air cooling which is not accompanied by heat advection. When the conditions are known, this graph can be used to determine not only air cooling during heat advection, but also air warming during cold advection. The results for air warming during cold advection will have to be interpreted differently, depending on whether or not there is condensed moisture, i.e., cloudiness at the examined level. (Author)

AD-262 395 Div. 2, 3Q, 12
(5 Sep 61) OTS price $1.60

Air Force Special Weapons Center, Kirtland Air Force Base, N. Mex.
AN EXPERIMENTAL PAYLOAD TO INVESTIGATE THE SOLAR WIND-GEOMAGNETIC FIELD INTERFACE,
by David J. Knecht. Aug 61, 15p. incl. illus.
(Rept. no. AFSWC TN 61-34)
(Proj. 7811)
Unclassified report

DESCRIPTORS: *Solar atmosphere, *Terrestrial magnetism, Solar sails, Protons, Exosphere, Astrophysics, Space probes, Magnetometers, Instrumentation, Spectrographic analysis, Detectors, Programming, *Proton counters.

The preliminary design is given for an experiment to measure certain properties of the region of interaction between the solar wind and the earth's magnetic field. The instrumentation described will measure magnetic fields and low-energy proton spectra in a manner such that very accurate directional and time correlations can be made; the sampling rate will be high enough to study the transient phenomena which may be characteristic of this region. The experiment is to be flown on Blue Scout Junior probe vehicles to altitudes of 50,000 to 100,000 miles during FY62. (Author)

AD-262 419 Div. 2
(5 Sep 61) OTS price $1.60

Friedman, Morris D., West Newton, Mass.
ON THE QUESTION OF THE MEASUREMENT OF THE ELECTRON CONCENTRATION IN THE IONOSPHERE AND INTERPLANETARY SPACE,
by E. E. Mitiakova, N. A. Mitiakov, and V. O. Rapoport. July 61, 11p. 14 refs. (Trans. no. M-143 from Izvestiia VUZ, Radiofizika 3-949-956, 1960)
(Contract AF 19(604)8496)
(AFCRL-568)
Unclassified report

DESCRIPTORS: *Electrons, *Measurement, *Ionosphere, Satellite vehicle antennas, Van Allen radiation belt, Satellite vehicles, Translations.

The methods of determining the electron concentration in the ionosphere by using artificial satellites, as described in the literature, are analyzed briefly. Expressions are found for the phase and group paths of a signal emitted by the artificial satellite in a quasi-longitudinal approximation taking the sphericity of the earth into account. New methods of determining the electron concentration by measuring the angle between the polarization planes at two frequencies and also by measuring the difference in the group paths at two frequencies are discussed. It is proposed to use a combination of these two methods to measure the electron concentration of interplanetary space by using a cosmic rocket. (Author)

AD-262 420 Div. 2, 25
(5 Sep 61) OTS price $1.10

Friedman, Morris D., West Newton, Mass.
LUNAR TIDAL FLUCTUATIONS IN THE IONOSPHERE,
by V. A. Zaguliaeva. July 61, 6p. incl. illus. tables (Trans. no. Z-136 from Raprost. Radiovoln i Ionosf. Trudy, NIZMIRAN USSR 17:282-286, 1960)
(AFCRL-569) Unclassified report

DESCRIPTORS: *Ionosphere, *Tides, *Diurnal variations, Harmonic analysis, *Moon, USSR.

Results are presented of a calculation of lunar tidal fluctuations according to results of observations of vertical probing of four ionosphere stations (Ashkhabad, Moscow. Tomsk, Irkutsk). The results obtained were subjected to harmonic analysis and the amplitudes and phases of the first four harmonics were found. It appeared that the second harmonic, with the greatest amplitude 0.06 mc and a constant phase equal to approximately 10 o'clock lunar time, was fundamental for delta/sub o F2. The first, third and fourth harmonics in the resulting curve are very small. However, the amplitude of the first harmonic increases to 0.04 - 0.05 mc in the curves constructed for each phase of the moon separately and the phase varies regularly by 6 hours. This indicates that the amplitude of the tidal motions depends on the time of day. (Author)

AD-262 471 Div. 2
(6 Sep 61) OTS price $2.60

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
TESSERAL HARMONICS OF THE POTENTIAL OF THE EARTH AS DERIVED FROM SATELLITE MOTIONS.
Rept. on Research in Space Science,
by Yoshihide Kozai. 9 Aug 61, 20p. incl. tables. (Special rept. no. 72)
Unclassified report

DESCRIPTORS: *Earth, Potential theory, Functions, *Harmonic analysis, *Gravity, Satellite vehicles, Mathematical analysis, *Satellite vehicle trajectories, Orbital flight paths, Perturbation theory.

Observations were undertaken to determine the accurate values of zonal harmonics of the gravitational potential of the earth as determined from the motion of artificial satellites. The constants associated with the tesseral harmonics in the potential of the earth were derived with good accuracy. Analysis of the observations were made by use of the Differential Orbit Improvement program of Veis and Moore (Smithsonian Astrophysical Observatory differential orbit improvement program Seminar. Proceedings, Tracking, Programs and Orbit determination, Jet Propulsion Lab., 1960). Each orbital element of the satellite was expressed by the sum of a polynomial and trigonometric and exponential functions of time. The number of functions was restricted to 25, and the parameters to be varied were restricted to 23. Tables are presented to show approximate expressions for the orbital elements of the 3 satellites: Satellite 1958 Delta 2, Dec. 5-11, 1958; Satellite 1959 Alpha 1, April 6-26, 1960; and Satellite 1959 Eta, May 1, June 7, 1960. The amplitudes observed and the phase angles of various trigonometric terms for each element are also tabulated.

AD-262 510 Div. 2
(7 Sep 61) OTS price $4.60

Chicago U., Ill.
DEVELOPMENT PROCESSES ASSOCIATED WITH THE FORMATION AND MOVEMENT OF AN ALBERTA CYCLONE,
by William D. Bonner. Apr 61, 43p. incl. illus. table, 13 refs. (Technical rept. no. 4)
(Contract Nonr-212110, Proj. NR 082-161)
Unclassified report

DESCRIPTORS: *Cyclones, *Air mass analysis, Motion, Mountains, Climatic factors, Meteorological data, Convection, Mathematical analysis, Alberta, Intensity.

The contributions of vorticity advection aloft, horizontal thermal (thickness) advection, and indirectly the patterns of heating or cooling associated with vertical motion are computed for successive times during the initial formation and subsequent eastward movement of a typical Alberta cyclone. At the onset of cyclogenesis, vorticity advection aloft contributed little to the development, but assumed greater importance in later stages. Thermal advection was important at all times in determining the large-scale changes in lower levels. The region of low-level production of vorticity associated with the Rocky Mountains is very limited, but vorticity generated in this region spreads eastward over a larger area by horizontal advection. Surface cyclogenesis stops as soon as the surface front enters the low center. The importance of orographic influences evidently lies in the initial production of a locally intense trough, tuned to the scale of the Rocky Mountains and well ahead of the frontal trough associated with the parent cyclone, wherein circulation can be intensified on the approach of an upper-level divergence field. After the cyclone had moved away from the Rockies, horizontal thermal advection and advection of vorticity aloft were the important processes. (Author)

AD-262 518 Div. 2
(6 Sep 61) OTS price $1.60

Friedman, Morris D., West Newton, Mass.
ON THE THEORY OF NONSTATIONARY LIGHT SCATTERING,
by I. A. Klimishin. May 61, 10p. (Translation no. K-249, of Ukr. Fiz. Zh. 5:620-627, 1960)
(Contract AF 19(604)5969)
(AFCRL-353) Unclassified report

DESCRIPTORS: *Light, Scattering, Theory, Shock waves, Analysis, Gas flow, Upper atmosphere, Probability, Velocity, Differential equations, Integral equations, Functions, Quantum mechanics, Integral transforms, Thermal radiation.

A strong shockwave-front which moves in the atmosphere of the earth (or even in a starry envelope or in interstellar space) radiates light; the radiant energy is here absorbed by the gas ahead of the wavefront to some degree. Radiant energy from a strong shockwave front considerably affects the magnitude of the temperature jump at the wavefront and determines its configuration. The interaction of strong shockwaves with radiation is discussed. Before applying the modern theory of light scattering to gasdynamics problems, it is necessary to develop a theory of nonstationary light scattering in a medium with moving boundaries. (Author)

Division 2 - ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-262 601 Div. 2, 30
(7 Sep 61) OTS price $6.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
THE APPLICATION OF ELECTRONIC COMPUTERS TO THE CONSTRUCTION OF THE THEORIES OF PLANETARY MOTIONS,
by N. G. Polozova. 3 Aug 61, 65p. incl. tables. (Trans. no. MCL-890 of Byulleten' Instituta Teoreticheskoy Astronomii 7:599-638, 1960)
Unclassified report

DESCRIPTORS: *Astronomy, *Celestial mechanics, *Planets, Scientific research, Solar systems, Motion, USSR, Technological intelligence, Computers, Mathematics, Series, Tables, *Digital computers, Saturn.

The construction of the analytical theories of planetary motion of minor planets by the Hill method using electronic computers is treated. All the calculation stages are studied in detail; corresponding programming systems are set up; and first order perturbations of Ceres due to Saturn are computed on the machine Strela as an example. (Author)

AD-262 614 Div. 2, 25
(7 Sep 61) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
ATMOSPHERIC TRANSMITTANCE COEFFICIENT AS DETERMINED FROM POLARIZATION OF SKY LIGHT,
by Ye. V. Pyaskovskaya-Fesenkova. 7 Aug 61, 7p. incl. illus. (Trans. no. MCL-1123 of Doklady Akademii Nauk SSSR 134:812-815, 1960)
Unclassified report

DESCRIPTORS: *Sky brightness, *Luminescence, Measurement, Sky, *Light, *Polarization, Recording devices, Photometers, Atmospheric refraction, Wave transmission.

Observations of the luminance of the sky with and without polaroids, using the visual photometer, were carried out in 1956 and 1957 at a mountain observatory (h equals 1450 m above sea level), at the Aksengerskiy Sovkhoz (h equals 500 m) in the vicinity of Alma Ata, and in the Libyan desert of Egypt (h equals 200 m). Measurements were also made along the solar almucantar. The solar radiation and luminance of the near-sun aureole were simultaneously measured using an aureole photometer with a selenium cell, at various zenith solar distances. (Author)

AD-262 661 Div. 2
(20 Sep 61) OTS price $4.60

Radio Observatory, Calif. Inst. of Tech., Pasadena.
THE HYDROGEN LINE IN ABSORPTION,
by B. G. Clark, V. Radhakrishnan, and R. W. Wilson. 1961, 44p. incl. illus. tables, 27 refs.
Unclassified report

DESCRIPTORS: *Radio astronomy, *Hydrogen, Spectrographic analysis, *Absorption, Stars, *Galaxies, Nebulae, Interferometers, Temperature, Density, Novae, Radiometers, Measurement.

Twenty-one-cm absorption spectra have been obtained for 12 radio sources using conventional techniques. Six of these sources were also studied with a hydrogen-line interferometer. Differences in the profiles obtained by the 2 methods give information on the structure and temperature of the HI clouds seen in absorption. Estimates of the angular sizes of 4 clouds based on these differences lead to an average diameter of 13 parsecs. In some cases it has been possible to find an upper limit to the temperature of the clouds somewhat lower than the generally assumed 125 K. A temperature of 60 K is suggested, giving densities of 20 atoms/cc and masses of 1000 MO for the absorbing clouds. (Author)

AD-262 688 Div. 2
(11 Sep 61) OTS price $13.50

American Meteorological Society, Boston, Mass.
JET STREAMS IN THE ATMOSPHERE (Struinye techeniia v atmosfere)
by Kh. P. Pogosian, tr. by Richard M. Holden. Mar 61, 192p. incl. illus. tables, 121 refs. (Trans. no. T-R-351 of Gidrometeorologicheskoe Izdatel'stvo, 1960. 178p.)
(Contract AF 19(604)6113)
Unclassified report

DESCRIPTORS: Atmosphere, *Jet streams (Meteorology), Stratosphere, Northern hemisphere, Meteorological data, Wind, Temperature, Air mass analysis, Barometric pressure, Climatic factors, Tables, USSR.

This monograph contains the results of an investigation of tropospheric and stratospheric jet streams over the northern hemisphere. The structural characteristics and other characteristics of jet streams over Eurasia are discussed in detail. Separate sections are devoted to the origin, evolution and dissipation of jet streams, their connection with atmospheric fronts, pressure formations, etc. The monograph contains charts, graphs and tables, including: individual and mean-monthly vertical cross sections of the atmosphere between the equator and the North Pole up to 28-30 km in different longitudinal zones of Eurasia and different seasons of the year; data on the temperature regime and charts of the average wind speeds (isotachs) of the upper troposphere and the stratosphere; pressure topography charts of the main isobaric surfaces for the winter and summer of the northern hemisphere, etc. A separate chapter is devoted to the problems of the formation of the stratospheric temperature and wind fields and an attempt is made to represent the vertical winter and summer temperature distribution and the atmospheric circulation up to 90-100 km. (Author)

AD-262 721 Div. 2
(11 Oct 61) OTS price $12.00

Woods Hole Oceanographic Institution, Mass.
CLOUD STRUCTURE AND DISTRIBUTIONS OVER THE TROPICAL PACIFIC. PART II,
by Joanne S. Malkus, Herbert Riehl and others. Aug 61, 1v. incl. illus. tables (Ref. no. 61-24)
(Contract Nonr-172100; In cooperation with Colorado State U., Fort Collins)
Unclassified report

DESCRIPTORS: *Clouds, Distribution, Tropical regions, *Photographic analysis, Stratus clouds, Cirrus clouds, Cumulus clouds, Tables, Meteorological data, Pacific Ocean, *Climatic factors.

An observational study of tropical oceanic clouds and their relation to the large-scale flow patterns is described. The basic material consists of three photographic flights made during July and August 1957 on Military Air Transport (MATS) cargo aircraft flying on regular schedules between San Francisco and the Phillipines. This analysis is concerned primarily with the results

of the second flight. Twenty-four hundred feet of time-lapse motion pictures resulted from this circuit. This report analyzes the cloud developments and distributions shown on the film and relates them to the three-dimensional air flow and atmospheric structure on each flight leg. A fascinating sequence of situations was encountered, which gain further informative value in comparison with those of the other two flights of the series. (Author)

AD-262 752 Div. 2
(13 Sep 61) OTS price $1.10

Geophysical Inst., U. of Alaska, College.
HIGH LATITUDE GEOPHYSICAL DATA FOR NOVEMBER 1960.
30 June 61, 8p. incl. tables (Rept. no. UAG-C 19)
Unclassified report

DESCRIPTORS: *Geophysics, Earth, Electric currents, Terrestrial magnetism, Noise (Radio), Ionospheric disturbances, Aurorae, Tables, Alaska, Cosmic rays.

AD-262 753 Div. 2
(13 Sep 61) OTS price $1.10

Geophysical Inst., U. of Alaska, College.
HIGH LATITUDE GEOPHYSICAL DATA FOR DECEMBER 1960.
30 June 61, 8p. incl. tables (Rept. no. UAG-C 20)
Unclassified report

DESCRIPTORS: *Geophysics, Earth, Electric currents, Terrestrial magnetism, Noise (Radio), Ionospheric disturbances, Aurorae, Tables, *Alaska, Cosmic rays.

AD-262 754 Div. 2
(13 Sep 61) OTS price $1.60

Geophysical Inst., U. of Alaska, College.
HIGH LATITUDE GEOPHYSICAL DATA FOR JANUARY-MARCH 1961.
1 Aug 61, 20p. incl. tables (Rept. no. UAG-C 21)
Unclassified report

DESCRIPTORS: *Geophysics, Earth, Electric currents, Terrestrial magnetism, Noise (Radio), Ionospheric disturbances, Aurorae, Tables, *Alaska, Cosmic rays.

AD-262 762 Div. 2, 30
(21 Sep 61) OTS price $13.00

Laboratory of Climatology, C. W. Thornthwaite Associates, Centerton, N. J.
MEASUREMENT OF VERTICAL WINDS IN TYPICAL TERRAIN.
Final rept.,
by C. W. Thornthwaite, W. J. Superior, and J. R. Mather. July 61, 182p. incl. illus. tables, 18 refs. (Rept. no. 4)
(Contract DA 36-039-sc-84940; Proj. 3A99-07-001-03)
Unclassified report

DESCRIPTORS: *Anemometers, *Wind, *Measurement, Vertical gust recorders, Terrain, Instrumentation.

This report describes a sensitive, three-bladed anemometer used to measure vertical air motion. The anemometer has a starting speed of less than 10 cm/sec., responds linearly to the vertical component of the wind and has an average distance constant of 1.0 meter. Observations of vertical velocity made at several different sites at Centerton are included. Various analyses of the data have been performed including 76 spectral analyses of simultaneous records of vertical and horizontal velocities, frequency histograms of sustained bursts of vertical activity, and studies of the time and space averaged values of u and w. Conclusions concerning the relative influence of vertical winds and of terrain on wind are included. (Author)

AD-262 791 Div. 2, 12, 30
(13 Sep 61) OTS price $.50

National Aeronautics and Space Administration, Washington, D. C.
CONTRIBUTIONS OF ROCKETS AND SATELLITES TO THE WORLD MAGNETIC SURVEY,
by J. P. Heppner, T. L. Skillman, and J. C. Cain.
Sep 61, 12p. incl. illus. tables (NASA Technical note D-705)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note no. D-705.

DESCRIPTORS: *Magnetic fields, *Mapping, *Satellite vehicle research, *Rocket research, Terrestrial magnetism, *Magnetometers, *Nuclear magnetic moments, Nuclear magnetic resonance.

Mapping of the earth's magnetic field with satellites is of primary importance in the World Magnetic Survey. This importance stems not only from the operational capability to map vast regions in minimum time, but also from the capability to differentiate the causes of variations in the earth's field. Rocket and space probe measurements supplement satellite surveys in providing cross-ties for mapping and in finding the sources of field variations. For most of the survey objectives, highly accurate measurements are required. Thus, magnetometers based on nuclear or atomic resonance offer many advantages. Vanguard III, (1959 eta), with a proton precessional magnetometer, was an initial step toward field mapping with an absolute instrument. Optical pumping magnetometers now make possible continuous absolute measurements over the full range of earth field intensities with low power dissipation. The Orbiting Geophysical Observatory satellites will probably be the primary vehicles for future magnetic field surveys. These include satellites in highly eccentric orbits with small inclination, and satellites in polar orbits of low eccentricity. (Author)

AD-262 797 Div. 2, 20
(13 Sep 61) OTS price $8.60

Maryland U., College Park.
GEOMAGNETICALLY TRAPPED PROTONS FROM COSMIC RAY ALBEDO NEUTRONS,
by A. M. Lenchek and S. F. Singer. July 61, 93p. incl. illus. tables, 58 refs.
(Contract AF 49(638)530)
(AFOSR-1179) Unclassified report

DESCRIPTORS: *Cosmic rays, *Albedo, *Protons, *Neutrons, Proton capture, Solar flares, Proton scattering, Terrestrial magnetism.

Albedo neutrons from galactic cosmic rays are shown to account for the gross features of the observed geomagnetically trapped protons. This source leads to an equilibrium intensity (at altitudes up to several thousand kilometers and at low latitudes) which compares quite favorably with observations, both in the shape of the energy spectrum, in the spatial distribution, and in the absolute intensity. In the analysis it is necessary to take account of the anisotropic

emergence of neutrons (above 50 Mev), and of nuclear interactions in the oxygen exosphere (above 300 Mev). More detailed features, such as the angular distribution, may also be computed from the neutron albedo theory but no observations are available for comparison at present. The phenomenon responsible for the absence of trapped protons beyond about 2 earth radii is not yet certain. A number of nonadiabatic mechanisms are compared. The contribution to the trapped protons by albedo from solar flare cosmic rays has been estimated. It produces appreciable effects principally for protons of low energy trapped along higher lines of force (1.5 - 2.0 earth radii). (Author)

AD-262 799 Div. 2, 25
(12 Sep 61) OTS price $2.60

Ionosphere Research Lab., Pennsylvania State U., University Park.
UPPER ATMOSPHERE DYNAMICAL MOTIONS WITH SPECIAL CONSIDERATION OF THE CORIOLIS FORCE AND INCLUDING THE EFFECTS OF ELECTRIC FIELDS,
by S. Chandra. 1 Aug 61, 25p. 18 refs. (Scientific rept. no. 150)
(Contract AF 19(604)4563)
(AFCRL-839) Unclassified report

DESCRIPTORS: *Upper atmosphere, *Electric fields, *Earth, *Magnetic fields, Atmosphere, Resonance, Ionosphere, Particles, Ions, Electrons, Velocity, Mathematical analysis, Diurnal variations.

The dynamical equations have been set up for the conditions existing in the upper atmosphere and their solutions have been obtained making some appropriate assumptions. It is shown that the semi-diurnal oscillation of the atmosphere is due to a Coriolis resonance and is independent of any physical property of the atmosphere. It is further shown how the pressure and density data can be used to compute the velocity of the neutral particles. The velocities of ions and electrons have been expressed in terms of the neutral particle velocity, the collision frequencies and the electric field. Using Maxwell's equations and the solution of the dynamical equations, a differential equation for electric field has been obtained containing the velocity of the neutral particles and collision frequencies. It is shown how the pressure, density and collision frequency data may be used to compute the velocities of neutral particles, electrons and ions, also the electric field. (Author)

AD-262 889 Div. 2
(14 Sep 61) OTS price $4.60

Army Map Service, Washington, D. C.
HORIZONTAL AND VERTICAL CONTROL FOR LUNAR MAPPING. (PART I. METHODS),
by Marvin Q. Marchant. Aug 60, 34p. incl. illus. (Technical rept. no. 29)
Unclassified report

DESCRIPTORS: *Moon, *Mapping, *Geodetic data, Extraterrestrial geography, Photographic analysis, Corrections, Atmospheric refraction, Standards, Mathematical analysis, Least squares method, Terrain, Surface properties.

The methods used at the Army Map Service for the determination of first- and second-order lunar control are presented. (Author)

AD-262 891 Div. 2
(14 Sep 61) OTS price $3.60

Air Weather Service, Scott Air Force Base, Ill.
WEATHER. APPLIED MILITARY CLIMATOLOGY.
1 Aug 61, 26p. incl. illus. tables (Rept. no. AWSM 105-3)
Unclassified report

DESCRIPTORS: *Climate, *Military research, Handbooks, Military training, Standards, Test methods, Weather forecasting, Meteorology.

This manual provides AWS meteorologists with information concerning the AWS climatology program. It outlines the mission, organization, procedures, and concepts of an applied military climatology service. The manual does not include a discussion of climatic analysis techniques or statistical procedures. (Author)

AD-262 949 Div. 2
(13 Sep 61) OTS price $7.60

Stanford Research Inst., Menlo Park, Calif.
AN INVESTIGATION TO ESTABLISH THE TRUE NATURE OF CLOUD COVER,
by Sidney M. Serebreny and Roy H. Blackmer, Jr.
June 61, 64p. incl. illus. tables (Scientific rept. no. 2)
(Contract AF 19(604)7312, Proj. 3245)
(AFCRL-698) Unclassified report

DESCRIPTORS: *Clouds, *Photographic analysis, *Radar analysis, Distribution, Photographic recording systems, Satellite vehicles, Jet planes, Visibility, Climatic factors, Meteorological data, Meteorology, Height finding.

Techniques are discussed by which three types of data can be used to describe more closely the true nature of cloud cover. The data are: (1) visual observations recorded on WBAN-10 forms, (2) records from vertically pointing radar, and (3) whole-sky photographs. (Author)

AD-262 965 Div. 2
(6 Sep 61) OTS price $1.10

Air Weather Service, Scott Air Force Base, Ill.
THE PREDICTION OF AFTERNOON VISIBILITY IN WINTER AT RAF UPPER HEYFORD.
Sep 60, 9p. incl. illus. tables (Air Weather Service rept. no. 28WS-60H-2)
Unclassified report

DESCRIPTORS: *Weather forecasting, *Wind, Meteorological data, *Visibility, Climatic factors, Diurnal variations, Mathematical analysis.

AD-263 020 Div. 2
(15 Sep 61) OTS price $3.60

Middlebury Coll., Vt.
THE STRANDFLAT OF ICELAND.
Final rept.,
by Vincent H. Malmstrom. Aug 61, 32p. 19 refs.
(Grant Nonr (G)0009-60, Proj. NR 307-263)
Unclassified report

DESCRIPTORS: *Iceland, *Beaches, Theory.

Implicit in this hypothesis of strandflat formation are the following conclusions: (1) A strandflat will only be formed in a region depressed by glaciation on a continental scale

(i.e., an ice sheet over 300-500 kilometers in diameter). (The Faeroes, which were covered by a local glacier, show no evidence of a strandflat.) (2) Although sub-aerial denudation and glacial erosion may contribute to the degradation of a coastal area, it is primarily marine abrasion that is responsible for producing the strandflat. (There are wave-cut cliffs over 500 meters high that have been glacially striated along parts of the Icelandic strandflat. Neither peneplanation nor glacial erosion leaves incongruous features of this relative relief immediately adjacent to a flat plain.) In any event, sub-aerial denudation, glacial erosion, and marine abrasion were all responsive to structural controls, in that they followed the lines of least resistance; hence, the monolithic outlines such as Akrafjall and Hafursey. (3) The age of the strandflat is post-glacial. (While it is not unlikely that strandflats were produced during each interglacial period, all evidence of such features has been obliterated during the formation of the present strandflat.) (4) Climate--especially access to an ice-free sea--is a more important determinant of a strandflat's geographic extent than is the geologic structure of the area so exposed. (Author)

AD-263 021 Div. 2
(15 Sep 61) OTS price $2.60

Middlebury Coll., Vt.
THE STRANDFLAT OF ICELAND. APPENDIX. MAPS AND TABLES,
by Vincent H. Malmstrom. 1961, 25p. incl. illus. tables (Appendix to Final rept., AD-263 020)
(Grant Nonr (G)-0009-60, Proj. NR 307-263)
Unclassified report

DESCRIPTORS: *Iceland, *Beaches, Theory.

AD-263 040 Div. 2
(15 Sep 61) OTS price $7.60

New York U. Coll. of Engineering, N. Y.
POWER SPECTRUM ANALYSES OF TURBULENT SURFACE WINDS OVER WATER UNDER INVERSION CONDITIONS,
by Joseph Pandolfo. July 61, 68p. incl. illus. tables, 31 refs.
(Contract Nonr-28503)
Unclassified report

DESCRIPTORS: Wind, *Sea breeze, *Temperature inversion, Atmosphere, *Meteorological data, *Spectrographic analysis, Measurement, Tables, Long Island Sound, Terrain, Micrometeorology.

Eight observations of the longitudinal, lateral, and vertical components of turbulent wind at 3 meters above the water surface in the wind speed range 3.5 to 6 m/sec and under inversion conditions are described. These observations were made over Long Island Sound during the summer of 1958 using a bivane-anemometor sensor system. Sensor outputs were recorded graphically with over-all sensor-recorder response characterized by a time constant of 0.7 seconds. Continuous 15 to 20 minute recordings were read at one per second for digital power spectral analyses. Estimates of the effects on spectral shapes and variances of various sources of error are estimated. Results in the form of variances and spectra of individual components and cross-spectra and cross-covariances of the longitudinal and vertical components are presented. Observed variances generally increase with increasing wind speed and with decreasing inversion strength. Variances and spectra are consistent with those obtained from the few previous observations over water and from observations over a short-grass surface when differences in wind speed, temperature stratification, and instrumental response are taken into account. (Author)

AD-263 060 Div. 2, 12
(18 Sep 61) OTS price $26.00

Air Force Cambridge Research Labs., Bedford, Mass.
CONTRIBUTIONS TO SATELLITE METEOROLOGY. VOLUME II,
ed. by Francis R. Valovcin. Apr 61, 553p. incl. illus. tables (GRD Research notes no. 36; AFCRL-438)
(Projs. 4982 and 6698)
Unclassified report

DESCRIPTORS: *Meteorological data, Collecting methods, *Satellite vehicles, Meteorological instruments, Telemetering data, Reliability, Clouds, Aerial photographs.

This analysis contains some preliminary results using photographs from TIROS I and some possible meteorological satellite applications of cloud and radiation data. Presented are: an operational evaluation of TIROS I; atmospheric radiation studies which have possible satellite applications; cloud studies; and meteorological satellite system analyses. (Author)

AD-263 069 Div. 2
(18 Sep 61) OTS price $1.60

Massachusetts Inst. of Tech., Cambridge.
APPLICATION OF WEATHER RADAR TO FALLOUT PREDICTION.
Quarterly technical rept. no. 13, 1 Mar-31 May 61,
by Pauline M. Austin. 15 June 61, 9p.
(Contract DA 36-039-sc-75030)
Unclassified report

DESCRIPTORS: *Radioactive fall-out, *Meteorological radar, Atomic bomb explosions, Storms, *Meteorological data, Precipitation.

Excellent data were obtained on a variety of weather situations ranging from snowstorms in March to hail and thunderstorms in May. Signal intensity contours on both radars, RHI photographs, R-meter measurements and radiosonde soundings were made. Work was resumed on designing and building a sweep integrater for use with short pulse on the AN/CPS-9 radar. It is probable that frequency modulation rather than amplitude modulation will be employed. A tipping-bucket rain gauge was built to operate on the outflow of the Hudson-Jardi gauge and thus monitor its operation. The rainfall data were greatly improved by this addition. The data reduction program and the analysis of storm structure are progressing satisfactorily. The computations on modification of fallout patterns by rain were slowed down by computer and program failures. (Author)

AD-263 090 Div. 2
(18 Sep 61) OTS price $.50

National Aeronautics and Space Administration, Washington, D. C.
MAGNESIUM AND CALCIUM IONS IN THE EARTH'S UPPER ATMOSPHERE (Iony Magniya i Kal'tsiya v Verkhney Atmosfere Zemli),
by V. G. Istomin. Sep 61, 9p. incl. illus. table (NASA Technical translation F-69 from Doklady Akademii Nauk (SSSR) 136:1066-1068, 11 Feb 61)
Unclassified report

Also available from NASA, Wash. 25, D. C. as NASA Technical translation F-69.

DESCRIPTORS: *Magnesium, *Calcium, *Ions, Upper atmosphere, *Earth, Oxygen, *Lithium, *Night sky, Luminescence, Measurement, Recording devices, Spectrographic data, Sounding rocket, Alkaline earth metals, Alkaline earth compounds, Atoms, *Ionosphere.

Presented are the results obtained from the launching of a geophysical rocket in June 1960, using a radio-frequency mass spectrometer several times more sensitive than had previously been used in similar Russian experiments. More than 100 spectra were obtained at altitudes from 92 to 206 kilometers, five of which had peaks with mass numbers M = 24 to M = 26. At an altitude of 103.5 kilometers a peak with M = 40 was observed. (Author)

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

AD-262 492 Div. 3, 16
(7 Sep 61) OTS price $3.60

Biological Labs., Frederick, Md.
SUMMARY OF DEVELOPMENT AND STANDARDIZATION STUDIES ON THE SHIPE SAMPLER,
comp. by Fred E. Ray. Apr 56, 30p. incl. illus. tables (Interim rept. no. 110)
Unclassified report

DESCRIPTORS: *Aerosols, *Bacterial aerosols, Design, Test equipment, Medical equipment, Bacteria, Effectiveness, *Serratia.

Comparisons were made with the Shipe Sampler and various types of other impingers and bubblers. Both Serratia marcescens and Bacillus globigii were employed as test materials and a wide variety of disseminating devices were employed. In general, the results indicated that aerosol recoveries were higher with the Shipe Sampler than with the all-glass impinger with vegetative cells, and that the difference between the two samplers was less with smaller mass median diameter aerosols. Studies were carried out to determine the number of bacteria escaping from samplers. It was found that 0.30 + or - 0.06 percent and 3.8 + or - 0.2 percent of the total collection slipped by the all-glass impinger and the Shipe Sampler, respectively. Attention was given to the differences in particle-size selectivity resulting from particulate retention in those samplers having curved intake tubes. Studies indicate that, with heterogeneous aerosols of a large mass median diameter, the lack of particle-size discrimination with the Shipe Sampler results in higher recoveries. Data indicate the destructive effect of the tangential jet Shipe Sampler tube somewhat less than that with the high-speed, direct-impingement samplers. (Author)

AD-262 685 Div. 3, 7
(11 Sep 61) OTS price $2.60

Aircraft Armaments, Inc., Cockeysville, Md.
E41R1 POINT SOURCE GAS ALARM.
Engineering progress report for period of 11 June-22 July 61,
by Edward B. Tyler. Aug 61, 26p. incl. illus. tables (Rept. no. ER-2473)
(Contract DA 18-108-cwl-6553)
Unclassified report

DESCRIPTORS: *Gas detectors, *Toxic agent alarms, Tests, Test equipment, Design, Effectiveness, Failure (Mechanics), Reliability, Pumps, Photometers, Sensitivity, Acoustic horns, Production, Vacuum switches, Thermostats.

Continued efforts in Research, Development, Test and Evaluation have been effected in the following areas: (1) testing of original and experimental design air pumps; (2) investigation of improved alarm horn performance and reliability; (3) investigation of improved performance and reliability in the case heater thermostats; (4) continuing efforts to improve the sensitivity and stability of the photometer; (5) testing of new configurations of the fluid pump; (6) investigations leading to a more reliable vacuum sensor switch; (7) a continuing program of investigations into the degradation of materials; and (8) maintenance and design evaluation by human factors personnel. (Author)

4. CHEMISTRY

AD-262 330 Div. 4
(31 Aug 61) OTS price $1.60

National Bureau of Standards, Washington, D. C.
HEATS OF FORMATION OF TWO ISOMERS OF DIFLUORODIAZINE,
by George T. Armstrong and Signey Marantz. June 61, 13p. incl. tables, 20 refs. (NBS rept. no. 7303)
(Sponsored by the Bureau of Naval Weapons)
Unclassified report

DESCRIPTORS: *Fluorides, Nitrogen compounds, *Azo radicals, Heat of reaction, Isomers, Heat of formation, Thermodynamics, Ammonia, Thermochemistry, Chemical bonds, Chemical reactions, Molecular structure, *Pyridines, Nuclear isomers.

The heats associated with the reaction of N2F2 with NH3 were observed for two mixtures containing the trans and the active isomers of N2F2 in different proportions. From the observed heats of reaction the heats of formation were determined to be 1/19.4 ± 1.3 and 1/16.4 ± 1.2 kcal mol for the trans and the active isomers, respectively. The bond energies in the two substances are discussed in terms of the possible molecular configurations. (Author)

AD-262 373 Div. 4, 10
(1 Sep 61) OTS price $8.60

Utah U., Salt Lake City.
IONS IN FLAMES,

by Nalin R. Mukherjee, Takayuki Fueno and others. 31 Dec 60, 87p. incl. table, 294 refs.
(Contract AF 04(647)177)
(AFBMD TN 60-10) Unclassified report

DESCRIPTORS: *Flames, *Gas ionization, *Hydrocarbons, *Fuel radicals, Acetylenes, Methanes, *Ions, Ionization, Plasma physics, Combustion, Pyrolysis, Thermochemistry, Thermodynamics, Reaction kinetics, Oxidation, Chemical reactions, Exhaust gases, Rocket fuels, Conductivity, Electrons, Electron transitions, Jet engine fuels, Carbon compounds, Monoxides, Hydrogen, *Bibliography, Aliphatic compounds.

Work on ionization in flames and related subjects such as combustion and pyrolysis is critically reviewed. It is assumed that saturated hydrocarbons and high molecular weight unsaturated hydrocarbons produce acetylene and the acetylene-oxygen mixture is responsible for the production of the most abundant ion. This assumption is justified by subsequent literature survey. Acetylene undergoes further chemical changes producing the CH radical which is directly responsible for the production of the most abundant ion. The probable chain reactions for the production of the CH radical are proposed. The mechanism of the formation of the most abundant ion and less abundant ions are illustrated. The high ionization in hydrocarbon flames is shown to be caused by electronically excited species. Reasons for the lack of high ionization in carbon monoxide and hydrogen flames are discussed. (Author)

AD-262 439 Div. 4
(5 Sep 61) OTS price $1.60

Naval Research Lab., Washington, D. C.
SOLUBILIZATION OF METHANOL BY SOAP MICELLES IN TOLUENE AS MEASURED BY GAS CHROMATOGRAPHY,
by Samuel Kaufman. 26 July 61, 11p. illus.
(NRL rept. no. 5639)
Unclassified report

DESCRIPTORS: *Methanols, *Colloids, *Soaps, Solubility, Toluenes, Naphthalenes, Sodium compounds, Magnesium compounds, Nonyl radicals, Sulfonates, Phenyl radicals, Stearates, Chromatographic analysis, Test methods, Fluorescence, Test equipment, Metallic soaps.

Gas-liquid chromatography was used to analyze equilibrium vapors over toluene solutions of sodium and magnesium dinonylnaphthalene sulfonates and magnesium phenylstearate containing total concentrations of methanol ranging from 0.2 to 2.6 wt-%. Resulting data were used to derive the extent of solubilization of methanol by these oil-soluble soaps. Within the region investigated, as many as five moles of methanol were solubilized per equivalent of soap. The degree of solubilization with respect to the concentration of available solubilizate was a function of the cation and its tendency to coordinate, as well as of the anion of the soap. The addition of water to a system containing 2.3% of methanol increased the proportion of methanol solubilized. Infrared data indicated that hydrogen bonding is an important influence in the solubilization process. Fluorescence depolarization data suggest a decrease in micelle size with increasing solubilization of methanol. Special precautions were required to minimize interferences and disturbances to the chromatographic observations arising from RF sources, unstable carrier-gas flow rates and pressures, and sampling valve contamination. (Author)

AD-262 502 Div. 4, 25, 30
(5 Sep 61) OTS price $11.00

Airkem, Inc., New York.
CHEMO-ELECTRICAL SENSING DEVICE,
by Milton Drexler and Myron Barchas. June 61, 139p. incl. illus. tables, 32 refs.
(Contract AF 30(602)2302, Proj. 5534)
(RADC TR 61-177) Unclassified report

DESCRIPTORS: *Gases, Air, Detection, Analysis, *Adsorption, *Thermistors, Thermal conductivity, Plastic coatings, Coatings, Thermodynamics, Thermoelectricity, Nitrogen compounds, Dioxides, Oxides, Ozone, Halides, Hydrogen compounds, Feasibility studies, Instrumentation, *Gas detectors.

The feasibility of utilizing gas adsorption phenomena in the identification and quantitative determination of various gaseous materials was investigated. Factors influencing the performance of the various components of an experimental gas analyzer based on the measurement of characteristic adsorption energies are discussed. Instrumentation specifications included ability to detect and measure concentrations of 10 ppm or less of NO, NO2, N2O3, HCl, HF and O3 in air, irrespective of the mixture involved. The system involved passing the air for analysis through a sensing cell which was to measure the heat of adsorption of the contaminant on an adsorbent-coated thermistor. On the basis of experimental and theoretical analysis it was concluded that a gas sensing device based on the principle of differential heats of adsorption is not feasible.

AD-262 575 Div. 4, 14, 25
(7 Sep 61) OTS price $1.60

Ohio State U. Research Foundation, Columbus.
RESEARCH ON PHASE EQUILIBRIA BETWEEN BORON OXIDES AND REFRACTORY OXIDES, INCLUDING SILICON AND ALUMINUM OXIDES.
Quarterly progress rept. no. 8, 1 Apr-30 June 61, by P. J. Gielisse, T. J. Rockett and W. R. Foster. 18 July 61, 11p. incl. illus. tables (Rept. no. 931-8)
(Contract AF 33(616)6509, Proj. 7021)
Unclassified report

DESCRIPTORS: *Silicon compounds, Oxides, Dioxides, *Boron compounds, *Aluminum compounds, *Phase studies, *Refractory materials, Thermodynamics, Materials, Phase transitions, Temperature, Glass, Liquids, Solids, X-ray diffraction analysis, Crystals.

The report summarizes the work done in the phase equilibrium investigations of the systems SiO2-B2O3, Si-B-O, Al2O3, and Al2O3-B2O3-SiO2. Refinement of the SiO2-B2O3 phase diagram was carried out. The elimination of some anomalous results from earlier work will facilitate the attainment of a satisfactory diagram for this system. Work in the Si-B-O system concerned the determination of phase compatibilities at 1300 C. Evidence that the system Si-B is considerably more complex than generally indicated was obtained. A dissertation covering the findings in the systems Al2O3-B2O3 and Al2O3-B2O3-SiO2 has been completed. (Author)

AD-262 605 Div. 4, 17
(7 Sep 61) OTS price $3.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
NIOBIUM IODIDE AND SOME OF ITS PROPERTIES,

by V. S. Yemelyanov, A. I. Yevstyukhin, and G. A. Leontyev. 6 July 61, 39p. incl. tables. (Trans. no. MCL-958 of Metallurgiya i Metallovedeniye Chistykh Metallov, Sbornik Nauchnykh Rabot, Moskva, Atomizdat 2:27-45, 1960)
Unclassified report

DESCRIPTORS: *Niobium, Purification, *Niobium compounds, *Iodides, Vaporization, Dissociation, Impurities, Synthesis, Chemical properties, Microstructure, Hardness, High temperature research, Carbon, Nitrogen, Oxygen, Physical properties, Translations.

The apparatus and techniques for the purification of Nb by the thermal dissociation of its iodides are described. Twenty-five thermal dissociation experiments were performed during which the temperature in various sections of the apparatus was varied and the products resulting were compared on the basis of hardness and microstructure. As a result of these experiments, it was concluded that (1) the thermal dissociation of volatile niobium iodides was possible, (2) the decrease in hardness and the disappearance of a second phase of niobium iodide indicated that purification was being accomplished, (3) the crystallization from the gaseous phase was temperature dependent on the filament temperature, and (4) the optimum conditions were established for the apparatus.

AD-262 701 Div. 4, 14
(11 Sep 61) OTS price $4.60

Hughes Aircraft Co., Culver City, Calif.
RESEARCH ON HIGH TEMPERATURE POLYMERS: SUMMARY REPORT: I. TITANIUM AND ALUMINUM CHELATES.
Technical rept. no. 4, 1 Sep 59-1 Sep 61,
by John B. Rust. 15 Aug 61, 52p. incl. illus. tables, 17 refs.
(Contract Nonr-254000, Proj. NR 356-395)
Unclassified report

DESCRIPTORS: *Polymers, *Heat resistant polymers, *Metalorganic compounds, *Chelate compounds, *Titanium compounds, *Aluminum compounds, Alkoxy radicals, Synthesis, Preparation, *Phenolic resins, Mechanical properties, Molecular structure.

A number of dichelates of titanium were prepared with the following structure: RO-Ti-OR with chelate groups such as (quinolin-8-oxy), (1,3-diphenyl-1-ketoprop-2-ene-3-oxy), or (2-ketopent-3-ene-4-oxy) attached to the Ti, and where the R group was either 2-propyl or trimethylsilyl. Reactions of the various titanium dichelates with equimolar quantities of water, acetic anhydride, dimethyldiacetoxysilane, or dibutyldiacetoxystannane were conducted. The products ranged from viscous oils to infusible solids. Monochelates of aluminum, similar to the dichelates of titanium described above, were prepared and reacted with several diacetoxy derivatives. In general, the products were insoluble and high melting. Composite chelates prepared by the combination of phenolic resins with aluminoxane or titanoxane polymers were formed into molded disks and laminated sheets reinforced with glass fibers. (Author)

AD-262 706 Div. 4, 14
(11 Sep 61) OTS price $4.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
ELECTROCHEMICAL OXIDATION OF TITANIUM SURFACES.
Technical rept. on Chemistry and Plastics,
by M. E. Sibert. Aug 61, 35p. incl. illus. tables, 11 refs. (Rept. no. 6-90-61-62)
Unclassified report

DESCRIPTORS: *Titanium, Surfaces, *Electrochemistry, Oxidation, Solvent action, Electrolytes, Anodes (Electrolytic cell), Titanium compounds, Oxides, Films, Thin films, Dielectric films, *Coatings, Electrical properties, Dielectric properties, Physical properties, Chemical properties, Electric currents, Temperature, Voltage.

Films produced on titanium depend on the nature and concentration of electrolyte, forming voltage, current density, and temperature. In most cases, dense films of limited thickness are produced; but in some cases, thick, porous films result. Physical, chemical, and electrical nature of the coatings are discussed together with their relation to the substrate surface character. Evidence indicates that films prepared in aqueous electrolytes are not of the rutile structure. These coatings are highly uniform, insulating, and adherent. (Author)

AD-262 713 Div. 4
(11 Sep 61) OTS price $2.60

Naval Ordnance Lab., White Oak, Md.
THE MEASUREMENT OF THE RATE OF DISSOCIATION OF OXYGEN AT HIGH TEMPERATURES.
Doctoral thesis,
by Jerome Eckerman. May 61, 27p. incl. illus. table, 15 refs. (Ballistics research rept. no. 14)
(NAVORD rept. no. 6724)
Unclassified report

DESCRIPTORS: *Oxygen, High temperature research, *Dissociation, Measurement, Reaction kinetics, Hydrodynamics, Gases, Shock waves, Thermodynamics, Velocity, Pressure, Test methods, Hypersonic flow, Differential geometry, Test equipment.

A new technique is described with which reaction rates in gases can be determined at high temperatures. First, the hydrodynamics of a dissociating diatomic gas is discussed; the conservation equations are applied across a normal shock wave. The thermodynamic variables are calculated as a function of the degree of dissociation. A mechanism of the shock location in front of a sphere traveling at supersonic speeds is proposed. Then, the relation between the shock separation distance and the rate of dissociation is discussed. The method is applied to the dissociation of diatomic oxygen. The experiment was carried out in a ballistics range. Small spheres were fired into pure oxygen at velocities from 6,000 to 12,500 fps at pressures of 20, 100, and 200 mm mercury. The separation distance of the shock wave from the sphere is measured on photographs of the sphere in flight. The dissociation rate is given which provides the best fit of predicted detachment distance to the experimentally observed distance. (Author)

AD-262 793 Div. 4
(13 Sep 61) OTS price $.50

National Aeronautics and Space Administration, Washington, D. C.
THE ELECTROCHEMICAL FLUORINATION OF ORGANOSILICON COMPOUNDS,
by Robert E. Seaver. Sep 61, 7p. incl. tables.
(NASA Technical note no. D-1089)
Unclassified report

Also available from NASA, Wash. 25, D. C. as NASA Technical note no. D-1089.

DESCRIPTORS: *Fluorination, *Silanes, *Electrochemistry, Methyl radicals, Ethyl radicals, Chlorine compounds, Phenyl radicals, Electrolysis, Decomposition, Fluorides, Silicon compounds, Test methods, Test equipment.

The electrochemical fluorination of tetramethylsilane, hexamethyldisiloxane, diethyldichlorosilane, amyltrichlorosilane, and phenyltrichlorosilane was conducted in an Inconel cell equipped with nickel electrodes. A potential of approximately 5.0 volts and a current of approximately 1.0 ampere were used for the electrolysis reaction. In all cases the fluorinations resulted in considerable scission of the carbon-silicon bonds yielding hydrogen and the various fluorinated decomposition products; no fluoroorganosilicon compounds were identified. The main decomposition products were silicon tetrafluoride, the corresponding fluorinated carbon compounds, and the various organofluorosilanes. It is suggested that this is due to the nucleophilic attack of the fluoride ion (or complex fluoride ion) on the carbon-silicon bond. (Author)

AD-262 806 Div. 4
(13 Sep 61) OTS price $1.60

Pennsalt Chemicals Corp., Philadelphia, Pa.
AN EFFICIENT AND INEXPENSIVE INERT GAS CHAMBER (PART A). DICHLORO(2,2'-IMINODIPYRIDINE)ZINC(II), DIACETATO(2,2'-IMINODIPYRIDINE)ZINC(II), AND DICYANO(2,2'-IMINODIPYRIDINE)ZINC(II) (PART B). DIPHENYLPHOSPHINIC ACID (PART C). THE PREPARATION AND STUDY OF CHROMIUM(II) COMPOUNDS (PART D),
by B. P. Block, L. R. Ocone and others. Aug 61, 20p. incl. illus. (Technical rept. no. 26)
(Contract Nonr-268700, Proj. NR 356-408)
Unclassified report

DESCRIPTORS: *Pyridines, Zinc compounds, Imines, Acetates, Cyano radicals, Phenyl radicals, *Phosphines, Organic acids, *Chromium compounds, Acetyl radicals, Acetones, Physical properties, Synthesis, Solubility, Test equipment, Controlled atmospheres, Gases, Preparation.

Contents:
An efficient and inexpensive inert gas chamber
Dichloro(2,2'-iminodipyridine)zinc(II),
diacetato(2,2'-iminodipyridine)zinc(II), and
dicyano(2,2'-iminodipyridine)zinc(II)
Diphenylphosphinic acid
Preparation and study of chromium(II) compounds

AD-262 847 Div. 4
(12 Sep 61) OTS price $1.60

Stanford U., Calif.
ELECTRON SPIN RESONANCE OF ALKYLATED BENZENE ANIONS.
Technical note on Electron Spin Resonance and Chemical Reactivity in Free Radicals,
by E. Pier and T. R. Tuttle, Jr. July 61, 14p. incl. illus. tables, 11 refs. (Technical note no. 482-5)
(Contract AF 49(638)482, Proj. 9760)
(AFOSR-428) Unclassified report

DESCRIPTORS: *Benzenes, Alkyl radicals, Toluenes, Methyl radicals, Ethyl radicals, Propyl radicals, Electrons, Nuclear resonance, *Nuclear spins, Free radicals, Electron charge.

Electron spin resonance absorption spectra are recorded and partially analysed for potassium toluenide, ethylbenzenide and isopropylbenzenide. The effect of methyl group substitution on spin distribution in the aromatic ring is shown to be small but measurable. A correlation between electronic structure and reactivity is pointed out. The relationship between spin and charge distribution is discussed. (Author)

AD-262 953 Div. 4
(14 Sep 61) OTS price $1.10

Fritz-Haber-Institut der Max-Planck-Gesellschaft (Germany).
THE DEPENDENCE OF THE 2ND VIRIALCOEFFICIENT ON THE CONSTITUTION OF THE ENDGROUP OF THE MACROMOLECULES.
Final technical rept., Sep 60-Aug 61,
by K. Uebrreiter, Aug 61, 9p. incl. tables.
(Contract DA 91-591-EUC-1556)
Unclassified report

DESCRIPTORS: *Polymers, *Styrenes, Polymerization, Molecular structure, Equations of state, Organic solvents, Naphthalenes, Chemical reactions, Low temperature research, *Equations of state, *Cryogenics, Thermistors, Osmotic pressure, Freezing, Molecular weight, Crystals.

A semimicro cryoscopic apparatus of high accuracy, based on the use of a Wheatstone bridge and a galvanometer system with thermistor, was developed to measure temperature. With this apparatus the 2nd virialcoefficients of four kinds of polystyrene, which have different endgroups, were determined in naphthaline. The error of the 2nd virialcoefficient was calculated. The influence of the endgroup on the 2nd virialcoefficient becomes effective with a degree of polymerization less than 15. (Author)

AD-263 097 Div. 4
(18 Sep 61) OTS price $1.60

Olin Mathieson Chemical Corp., New Haven, Conn.
BORON POLYMERS.
Quarterly progress rept. no. 1, 1 Mar-10 Aug 61,
by T. L. Heying. 5 Sep 61, 13p. incl. tables.
(Contract Nonr-339500, Proj. NR 356-431)
Unclassified report

DESCRIPTORS: *Polymers, *Heat resistant polymers, *Boron compounds, Borines, Phosphinoborines, Pentaboranes, Decaboranes, Diboranes, Synthesis, Preparation, Chemical reactions, *Metalorganic compounds, Chemical analysis, Microanalysis, Boron, Phosphorus, Determination, Chemical bonds, Infrared spectroscopy, Electrolysis, Phosphorus compounds.

The incorporation of P-B bonds within molecules is expected to create materials which are thermally stable. Triboradimethyne, B3C2H5, and tetraboradimethyne, B4C2H6, were obtained by the reactions of pentaborane and acetylene in a silent electric discharge. A series of perhydrodecaborate salts of the type (Phenyl3PR)2 B10H10 in which R is methyl, ethyl, propyl and butyl was prepared; the melting point of the compounds decreased progressively from 295 to 167 C. Three salts of the type (Phenyl3P(CH2) PPhenyl3B10H10) were prepared. The B10H12 unit was shown to be destroyed in reactions designed to substitute an H atom of a phenyl group of an attached ligand. A variety of symmetrical B10H12 compounds were prepared, the most interesting being ClPPhenyl2B10H12PPhenyl2Cl. Methods of replacement of the Cl atoms by other groups such as -NH2, CH3NH-, -OC2H5 have been established. Phenyl2PB10H13 was synthesized and in reactions explored, differs considerably from decaborane or tertiary phosphines. (Author)

Division 5 - COMMUNICATIONS

AD-263 099 Div. 4
(15 Sep 61) OTS price $1.10

Frick Chemical Lab., Princeton, N. J.
FURTHER RESULTS CONCERNING RUBBER ELASTICITY AND CHAIN CONFIGURATION,
by A. V. Tobolsky, D. W. Carlson and others.
29 Aug 61, 6p. incl. illus. table (Technical rept. no. RLT-35)
(Contract Nonr-185807)
Unclassified report

DESCRIPTORS: *Polymers, *Polymerization, *Copolymerization, *Acrylic resins, Methyl radicals, Additives, Propenes, Carboxylic acids, Elastomers, Plastics, Organic solvents, Molecular structure, Chemical bonds, Mechanical properties, Physical properties, Elasticity, Temperature.

The effect of introducing a functional group which could form H bonds with crosslinked acrylates and methacrylates was investigated. Reference values were: (1) the front factor relating distances between network junctures in the network and in free space (I); and (2) the intramolecular folding energy. For the combinations of acrylates and methacrylates and their respective acids it was concluded that the introduction of carboxyl groups along the chain had no major effect in the rubbery region. To study the effect of postswelling on I, various acrylates were polymerized in the presence of nonvolatile liquids. Results showed that the presence of solvent greatly reduces I; the relationship of I and solvent is linear; variation of I with solvent is independent of the solvent; and I of the lower acrylates decreases more than that of the higher acrylates.

AD-262 544 Div. 5, 8
(6 Sep 61) OTS price $5.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
EFFICIENT MULTIPLEXING OF INTERMITTENT TRANSMITTERS,
Technical rept. on Communications, Doctoral thesis,
by F. F. Fulton, Jr. July 61, 54p. incl. illus.
(Rept. no. 6-90-61-47)
Unclassified report

To be presented at the 1961 WESCON.

DESCRIPTORS: *Multiplex transmission, *Radio transmitters, Radio communication systems, Coding, Electrical networks, Signal-to-noise ratio, Switching circuits, Data transmission systems, Probability, Errors, Radio receivers, Mathematical analysis, Satellite vehicles, Statistical processes.

The limit of channel utilization is studied by postulating a model of a band-limited, noisy channel that incorporates the feature of random selection of a subset of transmitters to be multiplexed within the bandwidth. It is shown by a random coding argument that sets of waveforms certainly exist that can provide operation without interference for any finite number of transmitters assigned to the channel, provided only that the total information transmitted by any subset of transmitters be appropriate for the signal powers involved. This requirement is much weaker than the usual restriction that the waveforms assigned to different transmitters be orthogonal; under conditions of fractional utilization it permits operating at greater rates, or in smaller bandwidths. The effect of coding restrictions is to increase the power requirement. The required increase in power is not excessive, however. Even at the minimum length represented by binary coding, an example using waveforms taken from a systematically related set shows that a power increase of 7 db permits ten transmitters to be assigned to a bandwidth appropriate for three, if not more than three are active simultaneously. (Author)

5. COMMUNICATIONS

AD-262 357 Div. 5, 15
(1 Sep 61) OTS price $6.60

Stanford Electronics Labs., Stanford U., Calif.
RANDOM SIGNAL CODING FOR FINITE MESSAGE SETS,
by T. L. Grettenberg. 30 June 61, 65p. (Technical rept. no. 2004-3)
(Contract Nonr-22524, Proj. NR 373 360)
Unclassified report

DESCRIPTORS: *Communication systems, Coding, Signals, Statistical distributions, Probability, Matrix algebra, Functions.

The divergence between statistical hypotheses is used as a criterion for selection of a finite transmitter alphabet in a communications system. The members of the transmitter alphabet are sample functions from one of a finite set of normally distributed random processes. The receiver uses a maximum-likelihood decoding procedure, and the probability of error is evaluated for this receiver for a class of codes having orthogonal covariance functions. The codes with maximum divergence between alternate hypotheses are shown to be a special case of the codes with orthogonal covariance functions. The error probabilities of the maximum-divergence codes are then compared with the other codes having orthogonal covariance functions. (Author)

AD-262 702 Div. 5, 12
(11 Sep 61) OTS price $1.10

ITT Kellogg, Chicago, Ill.
FIXED GROUND COMMUNICATION SYSTEMS. WEAPONS SYSTEM 107A-2.
Program progress rept. no. 51 for July 61.
July 61, 3p. incl. illus.
(Contract AF 04(647)298)
Unclassified report

DESCRIPTORS: Guided missiles, Surface to surface, *Ground support equipment, *Launching sites, Communication equipment, Installation, *Communication systems, Maintenance, Public address systems, Intercommunication systems.

AD-262 703 Div. 5, 12
(11 Sep 61) OTS price $3.60

ITT Kellogg, Chicago, Ill.
FIXED GROUND COMMUNICATION SYSTEMS. WEAPONS SYSTEM 107A-1.
Program progress rept. no. 51 for July 61.
July 61, 27p. incl. illus.

(Contracts AF 04(647)123, AF 04(647)312, AF 04(647)461, AF 04(647)462, AF 04(647)486, AF 04(647)495, AF 04(647)502, AF 04(647)503, and AF 04(647)608)

Unclassified report

DESCRIPTORS: Guided missiles, Surface to surface, Surface to air, *Ground support equipment, Communication equipment, *Communication systems, Installation, Maintenance, *Launching sites, Panel boards (Electricity), Public address systems, Intercommunication systems, Radio communication systems.

AD-262 922 Div. 5, 8
(30 Aug 61) OTS price $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
SOME THOUGHTS ON MODULATION AND DEMODULATION FOR THE NEEDLES CHANNEL. PART I,
by R. Price. 15 Apr 59, 18p. illus. 12 refs.
(Group rept. no. 34-86)
(Contract AF 19(604)5200)

Unclassified report

DESCRIPTORS: *Radio communication systems, *Reflectors, Radio signals, Modulation, Linear systems, Signal-to-noise ratio, *Communications theory, *Radio receivers, *Multipath transmission, Scattering, *Radio transmission, Propagation, Statistical analysis, Theory, Detection, Communication systems, *Radiometers, Radio interference.

A highly random model for the Needles channel is adopted, and the application of detection theory yields a cross-correlator-radiometer receiver that is near-optimal at low S/N in the channel. Relationships to the Rake system are discussed. It is concluded that under certain conditions desirable waveforms for the Needles channel are sinusoids employed in a manner that circumvents intersymbol interference. Further conclusions about optimal durations for the sinusoids in terms of the channel dispersion, fluctuation rate, and S/N are deferred to a later report. (Author)

6. DETECTION

AD-262 343 Div. 6, 8
(31 Aug 61) OTS price $2.60

Radiation, Inc., Melbourne, Fla.
TELEMETRY TRANSDUCER HANDBOOK.
Monthly progress rept. no. 3, 15 July-15 Aug 61,
by H. F. Fisher, Jr. 22 Aug 61, 22p.
(Contract AF 33(616)8309, Proj. 4107)

Unclassified report

DESCRIPTORS: *Handbooks, *Telemeter systems, *Transducers, Research program administration, Instrumentation, Standards.

Efforts were continued in the up-dating and expanding of the telemetry transducer handbook. Two additional technical questionnaires were prepared. Over 1000 additional technical questionnaires including the new gyroscope and general questionnaires were mailed to manufacturers. (Author)

AD-262 554 Div. 6, 2
(6 Sep 61) OTS price $5.60

MacDonald Physics Lab., McGill U. (Canada).
IMPROVEMENTS IN WEATHER-RADAR GREY SCALE,
by F. T. Barath. July 61, 49p. incl. illus.
(Scientific rept. no. MW-33)
(Contract AF 19(604)6617)
(AFCRL-699) Unclassified report

DESCRIPTORS: *Meteorological radar, *Display systems, Cathode ray tubes, Cathode ray tube screens, Electronic circuits, *Video networks, Video signals, Image intensifiers.

Improvements have been made in four aspects of grey scale CAPPI displays for weather radars. In order to improve continuity of the echo patterns across the boundary between adjacent CAPPI elements, the gaps between elements have been reduced. The grey scale equipment is now used in such a way that the no-signal areas of the cathode ray tubes do not produce any luminance. This permits optical integration over the area of the displays. A new circuit provides consistent test patterns with each display for monitoring the luminance steps of the weather echoes and the threshold settings of the grey scale quantizing amplifier. Cams on the deflection coil servos had been used to trigger various components of the equipment and produced irregularities of the display sweep. A new slave servo system, rotating in synchronism with the antenna, now performs this function and has eliminated the irregularities. (Author)

AD-262 613 Div. 6
(7 Sep 61) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
TELUROMETER.
7 Aug 61, 2p. (Trans. no. MCL-1121 of Przeglad Techniczny 39, pp. 1, 1960)

Unclassified report

DESCRIPTORS: Technological intelligence, USSR, Radio waves, Microwaves, *Range finding, Translations, Parabolic antennas, Reflectors, Radio transmitters, Radio receivers.

The measurement of distance by the reflection of ultra-short radio waves, when the object is less than 50 km away from the observer, can be realized by the so-called telurometer. The apparatus is composed of a receiver and transmitter of directed waves which are picked up with parabolic reflectors. The length of the transmitted wave is of the order of 10 cm (frequency 3000 Mc). This wave is modulated with a frequency of 10 Mc by the main station s transmitter. The modulation of the wave by the second station is very complex. The distance is determined at the main station from the phase shift between the modulation of the wave sent by it and the modulation of the wave retransmitted by the second station. (Author)

AD-262 921 Div. 6
(25 Sep 61) OTS price $9.10

Allied Research Associates, Inc., Boston, Mass.
RECOGNITION AND IDENTIFICATION OF EARTH SATELLITES AND SPACECRAFT,
by John J. Shea and F. Bach Sellers. July 61, 95p. incl. illus.
(Contract AF 30(602)2273, Proj. 5556)
(RADC TR 61-195-B) Unclassified report

DESCRIPTORS: *Satellite vehicle research, *Spaceships, Identification, Detection, *Geometry, *Tables, Gamma rays, Neutrons, *Plasma physics, Magnetic fields, Magnetohydrodynamics, Inelastic scattering, Counting methods, Particles, Nucleons.

This volume of the report consists of four appendices. The first three of these are concerned with the calculation of the flux distributions in infinite slab geometry for three radiations: gamma rays, neutrons, and heavy charged particles. The results of these calculations are then employed to find the counting rate at a detector that is on the opposite side of a semi-infinite slab from a source of monoenergetic monodirectional radiation. For each of the radiations noted above a counting rate equation is deduced that exhibits explicitly the dependence of the counting rate on the various parameters. These parameters include the strength of the source, the characteristics of the material composition of the slab, the geometrical factors and the characteristics of the detector. The fourth appendix discusses the magnetic field produced by a charged body moving through a plasma in the magnetohydrodynamic regime. Two models of the body, i.e., a point charge and a charged spherical shell, are considered, and the effect of finite sound velocity in the plasma is calculated. It is shown that while the major component of the magnetic field is non-propagating, a second propagating component is also produced. (Author)

AD-263 022 Div. 6, 8
(15 Sep 61) OTS price $3.60

Microwave Associates Inc., Burlington, Mass.
INVESTIGATION OF DUPLEXING TECHNIQUES AT HIGH DUTY CYCLE CONDITIONS.
Quarterly progress rept. no. 3, 1 May-31 July 61, by Harold S. Maddix. 31 July 61, 34p. incl. illus.
(Contract DA-36-039-sc-87385)
Unclassified report

DESCRIPTORS: *Radar duplexers, *Microwave equipment, Phase shifters, X band, Design, Switching circuits, Gas discharges, Discharge tubes, Quartz, Quartz crystals, Waveguide windows, Life expectancy, Tests, Transmit-receive tubes, Waveguides, Ferrites, Semiconductors, Ferromagnetic materials, Measurement.

Data are presented for a quartz cylinder pre-TR structure which was operated at an equivalent average power of 10 kw at 9500 mc. The quartz cylinder-baffle structure holds considerable promise for operation at the high average power and low peak power conditions encountered in high duty cycle duplexers. The maximum average power handling capability of the structure in a balanced pre-TR duplexer is greater than 10 kilowatts. TR tube keep alive oscillations modulate the RF leakage power. The modulation frequency is a harmonic of the keep alive oscillation frequency when the RF pulse repetition rate exceeds the natural keep alive oscillation frequency. The keep alive oscillation also creates an echo signal modulation of the order of 0.3 db during the interpulse period. (Author)

AD-263 025 Div. 6, 2
(15 Sep 61) OTS price $6.60

Massachusetts Inst. of Tech., Cambridge.
RESEARCH DIRECTED TOWARD THE INVESTIGATION OF RADAR TECHNIQUES FOR SEVERE STORM IDENTIFICATION AND THE MEASUREMENT OF PRECIPITATION GROWTH.
Final rept. 1 July 57-30 June 60, by Pauline M. Austin. Aug 61, 57p. incl. illus.
(Contract AF 19(604)2291)
(AFCRL-836) Unclassified report

DESCRIPTORS: *Meteorological radar, Effectiveness, *Storms, *Identification, Precipitation, Intensity, Measurement, Hail, Detection, Meteorology, Radar analysis.

Quantitative data in the form of averaged, range-corrected iso-echo contours were obtained in many summer storms including twelve squall lines. They were transcribed from film to contour maps and for nine squall lines they were reduced to digitalized form. Also photographs of the range-height indicator were taken in a large number of thunderstorms and in situations with less vigorous cellular convection. On 17 days signal intensity measurements with 10- and 3-cm radiations were made on angels. The accuracy of the measurements, techniques for calibration of radars and the attenuation of 3-cm radiation by heavy rain are discussed. Two techniques for hail detection were explored: (1) measurement of cancellation ratio to detect non-spherical particles; and (2) observation of exceptionally high reflectivity with 10 cm radiation. The latter method appears to be the more promising because of the complexity of operational techniques required for adequate coverage and accuracy in variable polarization measurements. A preliminary study of the structure and behavior of New England squall lines as shown by the signal intensity contours is summarized. (Author)

7. ELECTRICAL EQUIPMENT

AD-262 376 Div. 7
(1 Sep 61) OTS price $1.60

Uppsala U. (Sweden).
CONTRIBUTION TO THE CALCULATION OF LIGHTNING SURGES INDUCED IN ELECTRIC TRANSMISSION LINES, by Jacques Papet-Lepine. Jan 61, 16p. incl. illus. tables, 17 refs. (Scientific rept. no. 4)
(Contract AF 61(052)171)
(AFCRL-524) Unclassified report

DESCRIPTORS: *Transmission lines, *Electric cables, Electric currents, *Lightning, Electric discharges, Electric fields, Magnetic fields, Measurement, Theory, Mathematical analysis, Sweden.

The problem of indirect lightning surges in electric transmission lines is principally due to the mechanism of the lightning discharge itself. The development of the current along the channel determines the value and the form of the fields. A simultaneous comparison between the characteristics of the electric field measured with an open antenna and that obtained from the surge measured at a point of the line near the antenna should be of value. Even knowledge of the magnetic field registered by frame aerials and knowledge of the characteristics of the surges measured on the line at the same time would procure valuable information of the mechanism of the induction of the electro-motive forces of magnetic origin. (Author)

AD-262 437 Div. 7
(5 Sep 61) OTS price $1.60

Naval Research Lab., Washington, D. C.
THE SILVER OXIDE-ZINC ALKALINE PRIMARY CELL. PART V. COMPARISON OF POTASSIUM HYDROXIDE,

CESIUM HYDROXIDE, AND RUBIDIUM HYDROXIDE ELECTROLYTES,
by C. M. Shepherd and H. C. Langelan. 25 July 61, 15p. incl. illus. table (NRL rept. 5635)
Unclassified report

DESCRIPTORS: *Primary batteries, *Electrolytes, Potassium compounds, Hydroxides, Cesium compounds, Rubidium compounds, Oxides, Silver compounds, Zinc compounds, *Alkaline cells, Zinc, Silver, Electrodes, Density, Viscosity, Solubility, Physical properties, Electrical properties.

Preliminary work has been done on determining the capacities of the silver oxide-zinc alkaline cell when using CsOH or RbOH solution as an electrolyte. All the discharges were made using high-purity, sheet-zinc negative electrodes. It was found that the cell capacity, within limits, is directly proportional to electrolyte volume, to electrolyte concentration, and to the amount of CsOH or RbOH present in the electrolyte. At a given set of discharge conditions, the maximum capacity that could be obtained using CsOH or RbOH electrolytes was considerably less than could be obtained from KOH when compared on a weight basis. On a volume basis KOH was slightly better than CsOH or RbOH. (Author)

AD-262 511 Div. 7, 19
(6 Sep 61) OTS price $2.60

Coast Guard, Washington, D. C.
COMPARATIVE DISCHARGE TESTS OF BATTERY POWER SUPPLIES FOR MINOR LIGHTS.
21 Aug 61, 18p. incl. illus. table (Field Testing and Development Unit rept. no. 255)
(Proj. CGTD J16/1-1-10)
Unclassified report

DESCRIPTORS: *Storage batteries, Power supplies, *Navigational lights, Lighthouses, Beacon lights, Tests, Life expectancy, Wet cells, Dry cells, Resistance, Test methods, Electrical equipment, *Reliability, Electric discharges.

Six different batteries used in Coast Guard battery systems for aids to navigation were comparatively tested by discharging each system through the same flashing lamp load. Curves of open and closed circuit voltage versus time and versus delivered ampere hours are presented. The effect is discussed in internal battery resistance on the effective candlepower of the flashing lamp. (Author)

AD-262 512 Div. 7, 23
(8 Sep 61) OTS price $1.00

Curtiss-Wright Corp., East Patterson, N. J.
STUDY PROGRAM FOR SIMULATOR COMPONENT INTERCONNECTORS.
Rept. for 14 Jan 60-4 Apr 61, on Training Equipment, Simulators and Techniques for AF Systems.
Apr 61, 28p. incl. illus. tables.
(Contract AF 33(616)6896, Proj. 6114)
(ASD TR 61-71) Unclassified report

DESCRIPTORS: *Flight simulators, Training devices, *Electric connectors, Design, Computers, Wiring diagrams, Electrical networks, Crimping tools, Electric terminals, Electric cables, Panel boards (Electricity), *Reliability, Instrument panels, *Maintenance, Programming.

Component interconnecting techniques, patching logic and component distribution were developed which can be incorporated into the designs of training simulators. The techniques developed are to attain flexibility and versatility of general purpose computers for simulators to lessen the arduous operations presently incurred whenever alterations to an existing system are required. Emphasis was placed on providing a means to accomplish this desired result without increasing the size or space required for any given cabinet. In fact, using the techniques derived herein, the cabinet size and space needed has been cut down. A hermaphrodite body type of connector was selected utilizing crimp type pins and sockets, affixed to standard lengths of wire which in turn are inserted into the prescribed holes in the connector body as dictated by the electrical circuit design. (Author)

AD-262 528 Div. 7, 4
(7 Sep 61) OTS price $1.60

Polytechnic Inst. of Brooklyn, N. Y.
FUEL CELL MATERIALS.
Quarterly progress rept. no. 2, 1 Dec 60-28 Feb 61,
by Harry P. Gregor. 28 Feb 61, 18p. incl. illus.
(Contract DA 36-039-sc-85384)
Unclassified report

DESCRIPTORS: *Fuel cells, Materials, *Electrolytes, *Membranes, Stability, *Power supplies, Organic solvents, Ion exchange, Design, Electrochemistry, Preparation, Polymers, Resistance, Electrolytic cells, Transport properties.

An improved cell for the measurement of the ohmic resistance of fuel cell electrolytes was designed. Work is being continued on improved homogeneous- and heterogeneous-type membranes; these will have catalyst incorporated into their faces. Cells for measuring the functional behavior of membranes in mixtures of organic liquid fuels and water were designed and are under construction. (Author)

AD-262 595 Div. 7
(6 Sep 61) OTS price $6.60

United States Electric Mfg. Co., New York.
RELIABILITY STUDY. HIGH RATE LECLANCHE WAFER CELLS.
Annual rept. no. 1, 1 Mar-15 Apr 61,
by Martin Sulkes. 15 Apr 61, 63p. incl. illus. tables.
(Contract DA 36-039-sc-85266)
Unclassified report

DESCRIPTORS: *Dry cells, Reliability, Manufacturing methods, Tools.

Phases I and II, tooling and pilot production, has been completed. Work on the project has advanced into Phase III. The tool, jigs and dies necessary for the completion of Phase I were completed within the allotted time period without encountering any unusual problems. New methods of production of the wafer cell units were developed necessitating minor adjustments of equipment previously used for prior contracts. These were also accomplished within the required time period. Manufacture of the seventeen (17) lots of wafer cell units as described in the Signal Corps Technical Requirements SCL-7510 with revisions proceeded as scheduled except that one (1) lot of high temperature batteries was destroyed by malfunctioning of the heat chamber. These were subsequently replaced. Phase III, the testing of wafer cell batteries, has been partially completed for the first eleven (11) lots produced. All testing after three months storage has been completed for lot a to s. (Author)

Division 7 - ELECTRICAL EQUIPMENT

AD-262 616 Div. 7
(8 Sep 61) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
ON THE DYNAMIC OPERATING MODES OF AN ASYNCHRONOUS MOTOR CONTROLLED BY THE SUPPLY VOLTAGE FREQUENCY OF THE MOTOR (Pro Dinamichni Rzhimi Asinkhronnogo Privoda Shcho Upravlyaetsya Chastoteyu Napragi na Dviguni),
by Yu. N. Rozov. 17 July 61, 8p. incl. illus.
(Trans. no. MCL-1131 of Avtomatika 1:63-68, 1960)

Unclassified report

DESCRIPTORS: Technological intelligence, USSR, Translations, *Electric motors, Frequency, Control systems, Non-linear differential equations.

The results are discussed which were obtained in investigating the dynamic conditions in an asynchronous frequency drive system. The goal of the investigation was to study the possibility of utilizing asynchron motor frequency control for reverse driving of manufacturing mechanisms and its operational characteristics, development of forcing methods to provide standard conditions for starting, stopping and reversing the motor. (Author)

AD-262 617 Div. 7
(8 Sep 61) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
DIRECT-CURRENT REVERSING MOTOR-AMPLIFIERS,
by I. P. Kopylov. 8 Aug 61, 13p. incl. illus.
(Trans. no. MCL-1132 of Izvestiya Vysshikh Uchebnykh Zavedeniy, Elektromekhanika 7:72-79, 1960)

Unclassified report

DESCRIPTORS: Technological intelligence, USSR, Translations, *Electric motors, Direct current, *Magnetic amplifiers, Circuits.

A number of reversing d-c motor-amplifier circuits are proposed. Motor-amplifiers combine a d-c motor with a magnetic amplifier constructed on the motor stator. By this combination a 30-40% reduction in weight is obtained by comparison with the separate magnetic amplifier-motor system. Since in power magnetic-amplifier drives the problem of weight is a crucial one, motor-amplifiers combining all the positive qualities of magnetic-amplifier systems with a minimum expenditure of materials are of great interest. Although the article is concerned with combined circuits, all the circuits proposed can be made with the motor and the magnetic amplifier operating separately. Thus everything referring to motor-amplifiers is also applicable to power magnetic amplifier-motors. (Author)

AD-262 651 Div. 7, 19
(8 Sep 61) OTS price $1.60

Coast Guard, Baltimore, Md.
CANDLEPOWER TESTS OF GENERAL RAILWAY SIGNAL COMPANY, TYPE W AND TYPE SA RANGE LANTERN.
31 Aug 61, 15p. incl. illus. tables (Rept. no. 256)
(Proj. CGTD J24-2/3-4)

Unclassified report

DESCRIPTORS: Photometers, Tests, *Navigational lights, Coast guard research, Measurement, Acceptability, *Lighting equipment.

This report describes photometric tests of the General Railway Signal Company Type W and Type SA Range lanterns used in Coast Guard Aids to Navigation. Candlepower and beam divergence tests are reported for various spread lenses using a series of C-2R and C-2V filament lamps. Also reported are tests with two CC-6 filament lamps. The transmission factors for the red and green color filters are also given. The report concludes that CC-6 filaments are suitable for use in the Type W and Type SA lanterns. (Author)

AD-262 737 Div. 7
(11 Sep 61) OTS price $1.60

Coast Guard, Washington, D. C.
TESTS OF DYNACRAFT SOLID STATE FLASHER.
Interim rept. no. 1.
1 Sep 61, 14p. incl. illus. tables (Rept. no. 257)
(Proj. J24-2/1-1-24)

Unclassified report

DESCRIPTORS: *Signal lights, Navigational lights, Design, Measurement, Temperature, Tests, Voltage, Intensity.

This report describes laboratory tests of a 3.75 to 6.3 volt solid state flasher designed for use in Coast Guard lighted aids to navigation. Measurements of flash characteristic, power consumption, voltage drop, and effective light intensity are given when operated with a 6.2 volt 0.46-ampere lamp, a 3.5-volt 0.3-ampere lamp, and a 3.5-volt 0.75-ampere lamp. Temperature and voltage variation effects are also included. The report concludes the flasher is incapable of operating the 3.5-volt 0.75-ampere lamp and will operate the 3.5-volt 0.3-ampere lamp at reduced light intensity. The timing device may be suitable for 6.2-volt lamps rated at 0.46 ampere or less. Life tests are now in progress. (Author)

AD-263 044 Div. 7, 12, 20
(18 Sep 61) OTS price $7.60

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
PRELIMINARY ENGINEERING ANALYSIS OF POWER SOURCES FOR SPACE VEHICLES,
by Emery F. Boose, Harold K. McCard, and Joseph G. Lundholm, Jr. 25 Aug 61, 72p. incl. illus. tables, 12 refs. (Technical memo. no. RAD-TM-61-12)
(Contract AF 04(647)305)

Unclassified report

DESCRIPTORS: *Electric propulsion, *Power supplies, *Electric power production, Space probes, Lunar probes, Solar energy, Nuclear energy, *Nuclear power plants, *Thermoelectricity, Storage batteries, *Turbines, Generators, *Solar cells, Fuel cells, Heat transfer, Thermal conductivity, Thermodynamics, Analysis, Theory.

A preliminary investigation has been made of 5 different power systems capable of continuously furnishing 10 kw of electrical power. The study was done in order to determine the pertinent system characteristics and to see which type of power system appeared most suitable for early use with an electrothermal propulsion system on a space vehicle. Of the systems considered, the study shows that at the present time, the nuclear turbine-alternator system is the best choice. If there was a question of reliability of the turbine-alternator unit, or if the orbital start-up problem is not satisfactorily solved, then the nuclear thermoelectric system would be the next choice with a 400-lb weight penalty over that of the nuclear turbine-alternator system. (Author)

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-262 334 Div. 8, 26
(31 Aug 61) OTS price $2.60

Pacific Semiconductors, Inc., Lawndale, Calif.
PRODUCTION ENGINEERING MEASURE FOR VARIABLE CAPACITOR DIODES.
Quarterly rept. no. 3, 1 Jan-31 Mar 61, by S. O. Davidsen. 31 Mar 61, 23p. incl. illus. tables (PSI rept. no. 4000:8-3-Q)
(Contract DA 36-039-sc-85942) Unclassified report

DESCRIPTORS: Variable capacitors, *Diodes, *Manufacturing methods, Frequency modulation, Frequency stabilizers, Automatic, Modulators, *Modulator tubes, Electron tubes, *Tuning devices, Production, Processing, Quality control, Electronic equipment, Diffusion, Reliability, Storage, Temperature, Design, Electrostatic capacitance, Tests.

Work aimed at reducing the reverse current is described which includes work on etching techniques, surface protectants, dicing, and mounting. A new time-saving diffusion technique using separate predeposition and redistribution steps is described. The foil press junction formation technique was incorporated in the engineering line and the initial difficulties experienced are described. Three lots are evaluated and various characteristics plotted showing the need for a tighter process control. The initial reliability data from high temperature storage is analyzed showing the reverse current characteristics as the only potential catastrophic failure candidate. (Author)

AD-262 345 Div. 8, 26
(24 Aug 61) OTS price $1.60

Radio Corp., of America, Somerville, N. J.
70 MC, 1 WATT SILICON TRANSISTOR.
Quarterly rept. no. 8, 5 Mar-5 June 61, by F. L. Katnack. 5 June 61, 18p. incl. illus. tables.
(Contract DA 36-039-sc-81285) Unclassified report

DESCRIPTORS: *Transistors, Silicon, Very high frequency, *Manufacturing methods, Production, Storage, Life expectancy, Tests, Test methods, Thermal stresses, Transistor amplifiers, Amplifiers, Vibration, Fatigue (Mechanics), Failure (Mechanics), Processing, Design, Power amplifiers, Measurement.

Storage life test of 200 C for the pre-production samples was completed. The complete pre-production test results show three thermal resistance and two vibration fatigue failures. A process change was made in the pellet mounting area to correct this problem. Additional data indicate that the present device process will produce transistors meeting the specified requirements. (Author)

AD-262 348 Div. 8, 2
(1 Sep 61) OTS price $13.00

Stanford Electronics Labs., Stanford U., Calif.
THE EFFECT OF THE EARTH-IONOSPHERE WAVEGUIDE ON WHISTLERS,
by J. H. Crary. 17 July 61, 185p. incl. illus. tables, 48 refs. (Technical rept. no. 9)
(Contract AF 18(603)126)
(AFOSR-1092) Unclassified report

DESCRIPTORS: *Electromagnetic waves, Audiofrequency, *Ionospheric propagation, Mathematical analysis, *Electric discharges, Ionosphere, Propagation, Ionosphere models, Refractive index, Wave transmission, Electromagnetic fields, Polarization, Bearing finding, Errors, Loop antennas, Dipole antennas, Lightning, Magnetic fields, Goniometers.

The ray-theory (geometrical-optics) method is presented for the calculation of the effect of the earth-ionosphere waveguide on whistlers and other VLF signals. This model is the first one to include the total field excited by an elliptically polarized wave and the effect of the coupling between the horizontal (perpendicular) and vertical (parallel) components of the field resulting from the presence of the earth's magnetic field. The results show that this relatively simple model can explain most of the experimental results, including field-strength variations, apparent polarization, and apparent arrival angles. This agreement gives significant support to the duct theory of propagation. There is no theory that would explain most of the experimental results in terms of a signal arriving directly at the receiver from the direction of the magnetic field. Furthermore, these results provide for the first time a basis for evaluating the performance of antenna systems used in whistler observation and for estimating the effective area of a whistler. (Author)

AD-262 355 Div. 8, 6
(1 Sep 61) OTS price $2.60

Ministry of Posts and Telecommunications, Tokyo (Japan).
RADIO OBSERVATIONS AND RESULTS OF SPUTNIK 3.
Final rept. on the Satellite Tracking Project, by Yoshiaki Nakata, Miyao Kan and others.
Apr 61, 22p. incl. illus. tables.
(Contract AF 62(531)1235)
(AFCRL TR 60-374) Unclassified report

DESCRIPTORS: *Satellite vehicles, Tracking, Satellite vehicle trajectories, Orbital flight paths, *Doppler tracking, Radio waves, High frequency, Very high frequency, Magneto-optic rotation, Radio signals, Radio receivers, Ionospheric propagation, Wave transmission, Attenuation, Radiofrequency, Measurement, Atmospheric refraction.

A description is given of the instrumentation which was used in recording the radio waves transmitted from Sputnik 3 on the frequencies of 20 and 40 mc. Interesting results are presented which were obtained by analysis of the Doppler frequency shift and Faraday rotation in the observations for a period from January 1959 to April 1960. Furthermore, a discussion on the skip-zone is presented for the period when the satellite was below the height of maximum electron density. (Author)

AD-262 381 Div. 8, 26
(31 Aug 61) OTS price $5.60

Western Electric Co., Laureldale, Pa.
PRODUCTION ENGINEERING MEASURES. DIFFUSED SEMICONDUCTOR DEVICES 7, 12 PLUS 2N559 AND 2N1094.

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

Quarterly progress rept. no. 15, 10 Mar-10 June 61 on Establishment of Production Design and The Pilot Line Production of Devices 7 and 12 plus the Mechanization of the 2N559 and 2N1094 Transistors,
by B. N. Shugars. 10 June 61, 49p. incl. tables.
(Contract DA 36-039-sc-72729)
Unclassified report

DESCRIPTORS: *Semiconductors, *Transistors, *Manufacturing methods, Production, Industrial production, Design, *Machines, *Industrial equipment.

Mechanization of Device 12 -- The automatic wafer bonding, automatic wire bonding and dc and HF test machines were developed and used to produce the pilot units. Mechanization of 2N559-2N1094 -- The Header Continuous Rack Plating, Emitter Etching and 2N559 Testing and Packaging machines were completed. The Header Assembling Machine was operated and the results indicated that the machine could be used for limited assembly of product. The 4 machines which are in various stages of construction are Universal Cleaning and Plating, Can Assembly, Testing and Packaging - 2N1094 and Data Handling. The Universal Cleaning and Plating machine module which was used as a guide was satisfactorily proved-in. The design phase of the Can Assembly machine was completed and construction was started. (Author)

AD-262 382 Div. 8, 26
(31 Aug 61) OTS price $2.60

Western Electric Co., Laureldale, Pa.
INDUSTRIAL PREPAREDNESS STUDY. 2N667 AND 2N668 RUGGEDIZED AUDIO TRANSISTORS.
Quarterly progress rept. no. 12, 1 Mar-31 May 61, ed. by G. T. DeMoss and L. D. Emery, Jr.
31 May 61, 26p.
(Contract DA 36-039-sc-81252)
Unclassified report

DESCRIPTORS: *Transistors, Transistor amplifiers, *Audio amplifiers, Amplifiers, Diodes, *Manufacturing methods, Production, Alloys, Processing, Electrical properties, Tests, Design, Surfaces, Encapsulation, Test equipment, Reliability.

The completion is reported of the pilot run devices. Improved constraint and additional controls at alloying produced improvements in diode characteristics. The manufacturing interval required for assembly was reduced, providing more rapid feedback of process information. Modification of the electrical post-etch testing and closer control of the surface treatment and encapsulation processes resulted in the elimination of the unstable, anomalous characteristics experienced previously. (Author)

AD-262 391 Div. 8, 25
(1 Sep 61) OTS price $4.60

General Dynamics/Astronautics, San Diego, Calif.
LOW-ENERGY SPUTTERING STUDIES.
Annual rept. 15 July 60-14 July 61,
by Daniel McKeown, Amado Cabezas, and Edward T. MacKenzie. 14 July 61, 44p. incl. illus. 20 refs.
(Contract Nonr-315700, Proj. NR 012-403)
Unclassified report

DESCRIPTORS: *Gold, *Aluminum, *Secondary emission, *Rare gases, Helium, Neon, Argon, Xenon, Solid state physics, Ion beams, Instrumentation, Crystal oscillators, *Ion bombardment.

A study has been made on the sputtering of gold and aluminum in beams of noble gases at normal incidence between 0 and 1000 ev. Gold was bombarded by He(+), Ne(+), Ar(+), and Xe(+), and aluminum by Ne(+), Ar(+), and Kr(+). Sputtering was measured by the crystal oscillator method. Using 20-Mc crystals in the oscillator, it was possible to detect the average sputtering of 0.01 angstrom from a surface. Secondary electron emission from the target was suppressed, and sputtering yields, mu, are given in atoms per ion. Increases in mu with beam energy are a more nearly linear function than has been previously reported in terms of mu/1 + gamma, where gamma is the number of secondary electrons emitted per incident ion. The experimental results are interpreted and analyzed in the light of present theories on sputtering yields and thresholds. (Author)

AD-262 411 Div. 8, 25, 17, 26
(5 Sep 61) OTS price $7.60

CBS Labs., Stanford, Conn.
STUDY OF MICROJUNCTION FORMATION TECHNOLOGY.
Final progress rept., June 60-May 61,
by A. Ramsa and R. Engelmann. 30 June 61, 69p. incl. illus. (Rept. no. 1456)
(Contract DA 36-039-sc-85337)
Unclassified report

Original contains color plates; all ASTIA reproductions will be in black and white. Original may be seen in ASTIA Headquarters.

DESCRIPTORS: *Semiconductors, Electron beams, Ion beams, Surfaces, Impurities, Silicon, Electron bombardment, Ion bombardment, Theory, Processing, *Subminiature electronic equipment, Temperature, Welding, Alloys, Aluminum, *Diodes, Electrical properties, Metals, Vacuum apparatus, Mathematical analysis, Metal films, Physical properties, Design, Partial differential equations.

Research was continued on electron beam processing of semiconductor structures. After presenting details of the various experimental apparatus used and of the procedures followed in sample preparation, theoretical and experimental results on the formation of P-N junctions by electron beam processing are given. The theory of the dependence of processing temperature on sample geometry is developed, the heating capabilities of the electron beam are demonstrated, and various techniques for electron beam welding and alloying of different metals into silicon surfaces are reported. Aluminum-silicon P-N junctions are investigated in great detail and it is shown clearly that diodes with excellent electrical characteristics can be produced by this technique. (Author)

AD-262 412 Div. 8
(5 Sep 61) OTS price $5.60

Electron Tube Lab., U. of Michigan, Ann Arbor.
RESEARCH AND DEVELOPMENT ON HIGH-POWER CRESTATRONS FOR THE 100-300 MC FREQUENCY RANGE.
Quarterly progress rept. no. 4, 1 Apr-1 July 61, by G. T. Konrad and C. Yeh. July 61, 46p. incl. illus. tables (Rept. no. 03783-4-P)
(Contract NObsr-81403)
Unclassified report

DESCRIPTORS: *Radiofrequency amplifiers, Amplifiers, Electron tubes, Very high frequency, *Electron guns, Helixes, Coupling circuits, Electron beams, Focusing, Electrostatics, Theory, Design, Tests, Electron transitions, Phase measurement, Test equipment.

Research and development work was continued on both 100-watt and 1000-watt VHF, cw Crestatrons. Construction of the first 100-watt experimental model was completed. Some data on it is presented. Extensive data on one version of the electron gun to be used is presented. Final cold-tests were made and the results are given. Some data useful in the design of coupled-helix couplers was obtained. (Author)

AD-262 415 Div. 8, 6
(5 Sep 61) OTS price $1.10

Friedman, Morris D., West Newton, Mass.
METHOD OF INVESTIGATING RADIOWAVES IN THE TROPOSPHERE UNDER LARGE ANGLES,
by V. A. Zinichev, Iu. A. Ryzkov, and O. I. Iudin. May 61, 3p. (Trans. no. Z-135 from Izv. VUZ, Rad'Fiz., 4:177-178, 1961)
(Contract AF 19(604)8496)
(AFCRL-396) Unclassified report

DESCRIPTORS: *Radio waves, Radio signals, Atmosphere, *Electromagnetic wave reflections, *Refraction, Refractive index, Measurement, Radiometers, Radio receivers.

The role was studied of scattering by turbulent inhomogeneities of the troposphere on long-range tropospheric propagation of radiowaves. The effect of other propagation mechanisms was excluded. The idea of the method consisted in formulating experiments to study radiowave scattering under large angles by using antennas with narrow directivity patterns (approximately 40 min.). (Author)

AD-262 417 Div. 8, 25
(5 Sep 61) OTS price $1.60

Friedman, Morris D., West Newton, Mass.
ON THE THEORY OF COMBINATION SCATTERING OF WAVES ON A ROUGH SURFACE,
by F. G. Bass. June 61, 12p. (Trans. no. B-185 from Izvestiia VUZ, Radiofizika 4:58-66, 1961)
(Contract AF 19(604)8496)
(AFCRL-51) Unclassified report

DESCRIPTORS: Technological intelligence, USSR, Translations, *Electromagnetic waves, *Sound, *Scattering, Mathematical analysis, Theory.

Combination scattering of electromagnetic and acoustic waves by rough surfaces is analyzed. (Author)

AD-262 421 Div. 8
(5 Sep 61) OTS price $1.10

Friedman, Morris D., Inc., West Newton, Mass.
CORRELATION FUNCTION OF THE AMPLITUDES OF SIGNALS SCATTERED FROM AN ABSOLUTELY ROUGH SCREEN,
by I. S. Vsekhsviatskaia and E. E. Tsedilina. July 61, 6p. (Trans. no. V-158 of Rasprost. Radiovoln i Ionosf, Trudy Nizmiran USSR 27:287-291, 1960)
(Contract AF 19(604)8496)
(AFCRL-570) Unclassified report

DESCRIPTORS: Technological intelligence, USSR, Translations, Statistical functions, *Radio waves, *Reflection, Ionosphere, *Scattering, Radio signals, Diffraction gratings, Mathematical analysis.

The correlation function of the amplitudes of signals reflected from the ionosphere is calculated taking into account both random and directed motion in the ionosphere. It is shown that the correlation function for an absolutely rough ionosphere is the product of auto-correlation functions obtained in two limiting cases: when there is only drift or purely random motion of the scattering centers. (Author)

AD-262 422 Div. 8, 2
(5 Sep 61) OTS price $2.60

Friedman, Morris D., West Newton, Mass.
ANALYSIS OF THE SHAPE OF ATMOSPHERICS,
by S. V. Borodina. July 61, 25p. incl. illus. tables (Trans. no. B-187 of Rasprost. Radiovoln i Ionosf, Trudy, NIZMIRAN USSR 27:3-26, 1960)
(Contract AF 19(604)8496)
(AFCRL-571) Unclassified report

DESCRIPTORS: *Atmospherics, *Electromagnetic waves, Radio waves, Audiofrequency, *Propagation, Phase measurement, *Harmonic analysis, Ionosphere, USSR, Wave analysis, *Radio interference analyzers.

The results are described of the analysis of the shape of single atmospherics as obtained in recent years in NIZMIRAN. The propagation velocity of audio frequency electromagnetic waves and the effective conductivity of the lower part of the ionosphere at these frequencies can be determined on the basis of studying the phase characteristics of atmospherics by using a method proposed by IA. L. Al'pert (UFN 60:370, 1956). (Author)

AD-262 423 Div. 8
(5 Sep 61) OTS price $1.10

Friedman, Morris D., Inc., WestNewton, Mass.
ON THE QUESTION OF THE LIMITS OF APPLICABILITY OF THE SMOOTH PERTURBATIONS METHOD IN THE PROBLEM OF RADIATION PROPAGATION THROUGH A MEDIUM WITH INHOMOGENEITIES,
by V. V. Pisareva. Aug 61, 3p. (Trans. no. P-170 of Izvestiia VUZ, Radiofizika 4:376-377, 1961)
(Contract AF 19(604)8496)
(AFCRL-708) Unclassified report

DESCRIPTORS: Technological intelligence, USSR, Translations, *Radio waves, *Propagation, Perturbation theory, Mathematical analysis.

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-262 424 Div. 8, 25
(5 Sep 61) OTS price $1.10

Friedman, Morris D., West Newton, Mass.
PHASE AND AMPLITUDE FLUCTUATIONS DURING VERY DISTANT ELECTROMAGNETIC WAVE PROPAGATION OVER THE EARTH'S SURFACE,
by F. G. Bass and E. A. Kaner. Aug 61, 4p. (Trans. no. R-191 of Izvestiia VUZ, Radiofizika 4:377-379, 1961)
(Contract AF 19(604)8496)
(AFCRL-709) Unclassified report

DESCRIPTORS: *Radio waves, Electromagnetic waves, *Electromagnetic wave reflections, Propagation, *Scattering, *Attenuation, Atmosphere, USSR.

A treatment is given the determination of the intensity of the amplitude and phase fluctuations of radiowaves when the scattered radiation dominates in the fluctuating part of the field and the average field is determined by means of diffraction formulas. (Author)

AD-262 425 Div. 8, 25, 15
(5 Sep 61) OTS price $1.60

Friedman, Morris D., West Newton, Mass.
APPLICATION OF CONFORMAL MAPPING TO THE SIMPLEST PROBLEMS OF WAVE PROPAGATION IN INHOMOGENEOUS MEDIA,
by V. I. Ivanov. Aug 61, 12p. (Trans. no. I-130 of Zh. Vychisl. Mate. Mate. Fiz., 1:246-254, 1961)
(Contract AF 19(604)8496)
(AFCRL-710) Unclassified report

DESCRIPTORS: *Conformal mapping, *Electromagnetic waves, *Propagation, Mathematical analysis, Partial differential equations, USSR.

AD-262 429 Div. 8, 4
(5 Sep 61) OTS price $4.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
THE EFFECTS OF HIGH ENERGY RADIATION ON INFRARED OPTICAL MATERIALS. AN ANNOTATED BIBLIOGRAPHY,
comp. by George R. Evans and William E. Price. May 61, 43p. 88 refs. (Special bibliography no. SB-61-25)
(Contract AF 04(647)564)
Unclassified report

DESCRIPTORS: *Germanium, *Silicon compounds, *Silicon, *Dioxides, *Glass, *Quartz, *Radiation effects, *Infrared optical materials, Optics, Transmission, Infrared transmitters, Bibliography, Materials, Optical materials, Semiconductors.

A compilation of 88 abstracts on the effects of high energy radiation on infrared and other optical properties of germanium, silicon, germanium and silicon, fused and vitreous silica, glass, and quartz is presented. Effort was concentrated on finding changes in transmission properties but many peripheral subjects are included. The period covered is from 1950 to the present date. The abstracts are arranged by authors under each specific material. A corporate author index is also included. The following sources were checked: (1) Armed Services Technical Information Agency, (2) Institute of Metals, Journal, (3) Lockheed Missiles and Space Division, (4) Nuclear Science Abstracts, (5) Radiation Effects Information Center (Accession List), (6) Science Abstracts (Section A: Physics), (7) Semiconductor Electronics, (8) Semiconductors and Phosphors, and (9) Solid State Abstracts.

AD-262 438 Div. 8
(5 Sep 61) OTS price $.50

Naval Research Lab., Washington, D. C.
A 10:1 FREQUENCY MULTIPLIER WITH A 10:1 INPUT FREQUENCY RANGE AND AUTOMATIC FINE TUNING,
by J. E. McGeogh and G. K. Jensen. 28 July 61, 9p. incl. illus. table (NRL rept. no. 5634)
Unclassified report

DESCRIPTORS: *Frequency multipliers, *Tuned circuits, Automatic, Radiofrequency generators, Tuning devices, Direct current, Electronic circuits, Design, Power supplies, Tests, Broadband, Pentodes, Capacitors.

A 10:1 frequency multiplier was constructed which will multiply any selected frequency within the 100 kc to 1 mc portion of the NRL portable precision frequency meter band 1 output to provide a second band of operation covering a 1 to 10 mc range. Multiplication by ten is provided by X5 and X2 stages which are tuned by mechanically ganging the tuned circuits to the first two of six decade frequency-generator controls and using automatic tuning to follow frequency adjustments made by the remaining four controls. Automatic tuning is accomplished by adjusting the dc current through the control winding of a current-controlled inductance that forms a part of the resonant circuit. Automatic control is obtained by first supplying a sawtooth sweep current to the current-controlled inductance which in the absence of an input signal will repeatedly tune the circuits through the entire automatic control range. (Author)

AD-262 454 Div. 8, 26
(5 Sep 61) OTS price $14.50

RCA Service Co., Inc., Camden, N. J.
MAINTAINABILITY MEASUREMENT AND PREDICTION METHODS FOR AIR FORCE GROUND ELECTRONIC EQUIPMENT.
Progress rept. no. 3 on Phase 3.
15 June 61, 215p. incl. illus. tables, 96 refs.
(Contract AF 30(602)2057)
(RADC TN 61-141) Unclassified report

DESCRIPTORS: *Air force equipment, *Electronic equipment, *Maintenance, Reliability, Measurement, Mathematical prediction, Probability, Statistical analysis, Test methods, Maintenance personnel, Tests.

Research was continued in the development techniques to identify, measure, and predict the maintainability of Air Force ground electronic equipment. Principal accomplishments to date are: (1) Establishment of basic mathematical model, (2) Development of research plan, (3) Design of measurement methods for factors affecting maintainability, (4) Conduction of field and laboratory experiments to test developed methods, (5) Reduction and analysis of collected data, and (6) Development and examination of

basic maintainability specification indices. This report provides a review of the total program, but is primarily devoted to analysis of field data and the development of maintenance indices. A critique of the first validation program of the electronic maintenance proficiency test is appended. (Author)

AD-262 460 Div. 8
(5 Sep 61) OTS price $5.60

SFD Labs., Inc., Union, N. J.
RESEARCH ON SUPER POWER MICROWAVE AMPLIFIER.
Quarterly progress rept. no. 4, 1 Apr-1 July 61,
by H. L. McDowell. July 61, 48p. incl. illus.
(Contract DA 36-039-sc-85379)
(ARPA order no. 130-60)
Unclassified report

DESCRIPTORS: *Microwave amplifiers, *Power amplifiers, Amplifiers, Electron tubes, Space charges, X band, Electric fields, Magnetic fields, Beryllium, Copper, Cathodes (Electron tubes), Design, Electrodes, Anodes (Electron tubes), Radiofrequency power, Attenuation, Secondary emission, Microwave equipment, Tests.

Construction of the first SFD-203 tube was completed. Experiments on the SFD-202 and SFD-205 showed that frequency responses flat over 8 - 12% bandwidth can be obtained with constant anode voltage. Experiments on a smooth bore tube indicated that the frequencies of the space charge mode are largely determined by a coaxial line resonance of the stem. Experiments on the SFD-202 showed that control electrode turn-off can be accomplished with a geometry which is compatible with usual techniques for debunching spokes in the drift region. (Author)

AD-262 461 Div. 8, 25
(5 Sep 61) OTS price $7.60

Stanford Electronics Labs., Stanford U., Calif.
SOLID-STATE ELECTRONICS RESEARCH.
Consolidated quarterly status rept. no. 11,
1 Apr-30 June 61.
30 June 61, 69p. incl. illus. table.
(Contracts Nonr-22531, Nonr-22524, DA 36-039-sc-85339, DA 36-039-sc-73178, DA 36-039-sc-78296, DA 36-039-sc-85387, AF 33(616)7944, AF 33(616)7726, and AF 49(638)660)
Unclassified report

DESCRIPTORS: *Microwave amplifiers, Masers, *Parametric amplifiers, *Thermoelectricity, *Photoconductivity, *Reliability, Transistors, Silicon, Germanium, Electronic switches, *Solid state physics, Analog-to-digital converters, Switching circuits, *Scientific research.

AD-262 463 Div. 8
(5 Sep 61) OTS price $3.60

South Carolina U., Columbia.
NON-WAVEGUIDE TRANSMISSION OF MILLIMETER WAVES.
Final rept.,
by R. G. Fellers, S. T. Moseley, and S. Litman.
7 Aug 61, 39p. incl. illus. tables, 23 refs.
(Contract AF 18(603)43)
(AFOSR-1172) Unclassified report

DESCRIPTORS: *Wave transmission, *Microwaves, Absorption, Oxygen, Radar duplexers, Polarization, Dielectrics, Interferometers, Tests, Antennas, Radar antennas, Parabolic antennas, Reflectors, Radar reflectors, Scattering, Diffraction, Attenuation, Reflectometers, Prisms.

Research was continued on the development of non-waveguide transmission of millimeter waves. Test results have demonstrated successfully that a free-space transmission system can be operated with much lower attenuation than a conventional waveguide system. It has also been shown that transmission around corners can be accomplished at attenuation figures lower than those for straight line transmission. A number of devices including duplexers, directional couplers, attenuators, wavemeters, and reflectometers have been developed and operated in the free space medium. Theoretical computation of near zone fields and of transmission loss have only been commenced and no definitive results have been obtained. Future work in this field should include extension of the work to higher frequencies, development of additional devices and further pursuit of the theoretical computations. (Author)

AD-262 472 Div. 8
(5 Sep 61) OTS price $4.60

Aero Geo Astro Corp., Alexandria, Va.
INVESTIGATIONS OF FLUSH-MOUNTED ANTENNAS.
Quarterly technical note no. 2,
by D. M. Bowie, B. R. Gross and others.
28 June 61, 42p. incl. illus.
(Contract AF 30(602)2386)
(RADC TN 61-74) Unclassified report

DESCRIPTORS: *Slot antennas, Antennas, Electromagnetic waves, Electromagnetic theory, Propagation, Height finding, *Radio interferometers, Phase measurement, Antenna radiation patterns, Wave transmission, Measurement, Microwaves, Crystal mixers, Surfaces, Ultra high frequency, Phase distortion, Mathematical analysis, Waveguides.

Three areas were investigated: (1) corrugated surfaces with barriers a wavelength in height, (2) corrugated surfaces with barriers one-quarter wavelength in height, and (3) interferometer height-finding techniques. Under the first investigation the effect of a coarse corrugated structure having large, widely spaced barriers on vertically polarized waves was examined. Patterns are shown indicating the wave was not bound by the medium. The second investigation was initiated using a corrugated surface with adjustable spacing with barriers of height less than one-quarter wavelength. Results show, for spacing from 0 to 1/2 wavelength, a reduction in phase velocity and for spacing from 1/2 to 3/4 wavelength, phase velocity greater than the free-space value indicated. An experiment for demonstrating the technique of the interferometer height-finder was planned, which makes use of two radiation sources at a scale frequency at approximately 500 mc. This region makes it possible to extract phase information directly from the received signal and avoids the use of signal conversion techniques, which may present phase distortion errors. (Author)

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-262 490 Div. 8, 20
(6 Sep 61) OTS price $18.00

Hughes Aircraft Co., Culver City, Calif.
THEORETICAL STUDY OF BURST INDUCED TRANSIENT RADIATION EFFECTS IN BASIC ELECTRONIC CIRCUITS.
Final rept.,
by J. E. Bell and K. R. Walker. 15 May 61, 280p. incl. illus. tables.
(Contract AF 29(601)2538, Proj. 4778)
(AFSWC TR 61-40) Unclassified report

DESCRIPTORS: *Electronic circuits, Analog computers, Semiconductors, Diodes, Pulse generators, Mathematical prediction, Hazards, *Radioactivity, Trigger circuits, Transistor amplifiers, Audio amplifiers, Vacuum tube amplifiers, Transients, *Radiation effects, Programming.

An analog computer technique is shown to be a powerful tool for the theoretical investigation of transient radiation effects on electronic circuits. Four normally linear amplifier circuits were investigated with respect to DC and signal level change, recovery time and phase shift. The computer program included limits to indicate non-linear circuit response due to radiation. A semiconductor diode detector and two semiconductor bistable multivibrators were studied. The detector and bistable circuits were investigated using curve-follower techniques to simulate the semiconductor characteristics. The responses were analyzed for indications of DC and signal level changes, recovery time and abnormal switching. Both the linear and non-linear circuits were programmed with facilities for the variation of several circuit and radiation parameters. Further studies will include parameter variation, subsystem simulation, and basic computer techniques useful for more sophisticated analysis. (Author)

AD-262 500 Div. 8, 18
(25 Sep 61) OTS price $1.60

Antenna Lab., Ohio State U. Research Foundation, Columbus.
RESEARCH ON ELECTRONIC RECONNAISSANCE ANTENNAS.
Interim engineering rept., 1 Mar-31 May 61.
1 June 61, 12p. incl. illus. (Rept. no. 903-21)
(Contract AF 33(616)6211, Proj. 1610-6278)
Unclassified report

DESCRIPTORS: Antennas, *Antenna amplifiers, Mixer tubes, Electronic circuits, *Parametric amplifiers, Microwave amplifiers, Amplifiers, *Crystal mixers, *Phase shifters, Broadband, Band pass filters, Negative resistance circuits, Transmission lines, Impedance, *Dipole antennas, Impedance matching, Microwave equipment, Diodes, Design, Military intelligence.

A lossless electronic phase shifter, comprised of a parametric up-converter and conventional down-converter, both pumped by the same microwave source, is described. Matching of a negative resistance to a transmission line, and gamma matching of a tunnel diode to an antenna, are also considered. (Author)

AD-262 513 Div. 8
(7 Sep 61) OTS price $2.60

Electron Tube Lab., U. of Michigan, Ann Arbor.
APPLIED RESEARCH ON CROSSED-FIELD ELECTRON GUNS.
Interim scientific rept. no. 1, 1 Apr-1 July 61,
by J. E. Boers, N. A. Masnari and others.
July 61, 20p. incl. illus. (Rept. no. 04478-1-S)
(Contract AF 33(616)8111, Proj. 1670-4156)
Unclassified report

DESCRIPTORS: *Electron guns, Space charges, Electron beams, *Microwave amplifiers, Amplifiers, Test methods, Analog computers, Digital computers, Magnetic fields, Measurement, Noise (Radio), Wave transmission, Partial differential equations, Magnetrons, Diodes, Electron tubes, Design.

Research is concerned with the use of analog and digital computer methods along with analytical means to design and evaluate high-convergence, high-density electron guns of the M-type. Several methods of designing crossed-field electron guns for use in injected-beam crossed-field devices are outlined. An analog method utilizes a nonlinear function generator (Poisson cell) in conjunction with an analog computer to solve Poisson's equation. A digital computer program for the design of such guns is outlined, as well as a method for solving the problem of space-charge density calculations. Also a new type of hybrid electron gun is proposed which seems applicable to high-current density-pulsed devices. (Author)

AD-262 514 Div. 8, 2
(7 Sep 61) OTS price $3.60

Electrical Engineering Research Lab., U. of Texas, Austin.
RESEARCH ACTIVITIES IN MILLIMETER RADIOWAVES AND GEOMAGNETICS.
Final rept., 1 June 51-30 Apr 61.
31 July 61, 32p. incl. tables (Rept. no. 124)
(Contract Nonr-37501, Proj. NR 371-032)
Unclassified report

DESCRIPTORS: *Microwaves, Reflection, Attenuation, Absorption, Scattering, Radiometers, *Terrestrial magnetism, Data processing systems, Refractometers, Radio waves, Oxygen, Water vapor, Propagation, Microwave spectroscopy, Precipitation, Radar echo areas, Radar equipment, Temperature, Sun, Moon, Magnetic fields, Instrumentation, Radio astronomy.

Contents:
Millimeter radiowaves
Surface reflection characteristics
Atmospheric attenuation and the absorption of constituent gases
Angle of arrival and antenna pattern fluctuations
Precipitation attenuation
Backscattering and radar cross-sections
Solar, lunar and terrestrial radiometry
Instrumentation
Geomagnetics
Instrumentation
Microwave refractometry
Data processing facilities

AD-262 519 Div. 8
(6 Sep 61) OTS price $1.60

Friedman, Morris D., West Newton, Mass.
USE OF A TWO-ELEMENT INTERFEROMETER TO INVESTIGATE WAVE FIELD FLUCTUATIONS.

by G. A. Karpeev. June 61, 10p. incl. illus.
(Translation no. K-252, of Radiotekh. i Elektr. 6:355-362, 1961)
(Contract AF 19(604)5969)
(AFCRL-397) Unclassified report

DESCRIPTORS: Technological intelligence, USSR, Translations, *Radio fields, Mathematical analysis, *Interferometers, Measurement.

A theoretical estimate is presented of the fluctuations at the output of a two-element interferometer loaded by a squared detector. The dependence of the character of the output signal fluctuations on the spatial correlation properties of the amplitude-phase fluctuations of the field and also its regular characteristics are investigated. (Author)

AD-262 520 Div. 8
(6 Sep 61) OTS price $2.60

Friedman, Morris D., West Newton, Mass.
ON THE CURRENT DISTRIBUTION IN AN ANTENNA WITH NONMECHANICAL BEAM SCANNING,
by O. G. Vendik. June 61, 17p. incl. illus.
(Translation no. V-157, of Izv. VUZ, Radiotekh. 4:64-76, 1961)
(Contract AF 19(604)5969)
(AFCRL-512) Unclassified report

DESCRIPTORS: Technological intelligence, USSR, Translations, *Antennas, Electric currents, Antenna radiation patterns, Lobing, Mathematical analysis.

The singularities are considered of the radiating current distribution in an antenna whose principal maximum of the directivity pattern must move nonmechanically in a prescribed sector. A relation in general form is established between the number of linearly-independent current components and the ratio of the scanning sector to the width of the main beam of the antenna. (Author)

AD-262 522 Div. 8
(6 Sep 61) OTS price $1.60

Friedman, Morris D., West Newton, Mass.
ON THE PHASE CENTER OF ANTENNAS,
by A. R. Vol'pert. July 61, 13p. incl. illus.
(Translation no. V-159, of Radiotekh. 16:3-12, 1961)
(Contract AF 19(604)5969)
(AFCRL-580) Unclassified report

DESCRIPTORS: Technological intelligence, USSR, Translations, *Antennas, Phase measurement, Antenna radiation patterns, Mathematical analysis, *Dipole antennas.

An analytic form of the phase diagram is established for which antennas have a phase center. The properties of antennas without a phase center are analyzed. Simple examples are presented of discrete and linear antennas to which more complex structures can be reduced. (Author)

AD-262 523 Div. 8
(6 Sep 61) OTS price $1.60

Friedman, Morris D., West Newton, Mass.
ON TAKING ACCOUNT OF THE TOPOLOGICAL CHARACTERISTICS OF THE GRATING FACTOR IN DESIGNING FOUR-ELEMENT COPHASAL ANTENNAS WITH REDUCED SIDE EMISSION LEVEL,
by V. I. Beketov. Aug 61, 11p. incl. illus. table (Translation no. B-188, of Radiotekhnika 16:13-21, 1961)
(Contract AF 19(604)5969)
(AFCRL-587) Unclassified report

DESCRIPTORS: Technological intelligence, USSR, Translations, *Antennas, Broadband, Antenna radiation patterns, Topology, Lobing, Mathematical analysis, Diffraction gratings.

Means to diminish the side emission level in four-element cophasal antennas, based on taking account of the topological characteristics of the grating factor, are analyzed. (Author)

AD-262 526 Div. 8
(6 Sep 61) OTS price $1.10

Friedman, Morris D., West Newton, Mass.
GENERAL METHOD OF SEEKING THE OPTIMUM DISTRIBUTION FOR LINEAR ANTENNAS,
by V. L. Pokrovskii. Aug 61, 4p. incl. illus.
(Translation no. P-171, of Doklady AN USSR 138:584-586, 1961)
(Contract AF 19(604)5969)
(AFCRL-590) Unclassified report

DESCRIPTORS: Technological intelligence, USSR, Translations, *Antennas, Linear systems, Antenna radiation patterns, Lobing, Fourier analysis, Series, Mathematical analysis.

A general principle is presented for seeking the parameters of a linear antenna by which the problem of finding the optimum distribution of these parameters will reduce, in principle, to a numerical computation. Not only discrete but also continuous current distributions without singularities can be analyzed in such a general formulation if they are prescribed in the form of finite Fourier sums. (Author)

AD-262 534 Div. 8
(5 Sep 61) OTS price $3.60

ITT Federal Labs., Nutley, N. J.
INVESTIGATION OF ELECTRICALLY VARIABLE DELAY LINES II.
Final engineering rept. Apr 60-Apr 61,
by S. R. Hoh and G. R. Leef. May 61, 35p. incl. illus.
(Contract AF 30(602)1859, Proj. 4155)
(RADC TR 61-140) Unclassified report

DESCRIPTORS: *Delay lines, *Ferroelectric materials, Nonlinear systems, Very high frequency, Ultra high frequency, Dielectrics, Helixes, Microwave equipment, Attenuation, Barium compounds, Strontium compounds, Titanates, Capacitors, Design, Electrical properties, Tests.

The problems and techniques of electrically variable delay lines, based on non-linear ferroelectrics, were studied. The frequency range of interest was from 30-1000 mc. An experimental

helical delay line was developed for a minimum operating frequency of 200 mc. This line required the development of low loss materials of high permittivity and the development of low capacitance dielectric structures. (Author)

AD-262 639 Div. 8
(8 Sep 61) OTS price $6.60

Bartol Research Foundation, Franklin Inst., Swarthmore, Pa.
RESEARCH INVESTIGATION OF CATHODE EMISSIVE MATERIALS.
Final rept.,
by W. E. Danforth. 15 Apr 61, 86p. incl. illus. tables.
(Contract AF 19(604)3904)
(AFCRL-366) Unclassified report

DESCRIPTORS: *Cathodes (Electron tubes), *Electron tubes, *Thermionic emission, Tungsten, Thorium, Single crystals, Crystals, Metal films, Thin films, Metal coatings, Density, Surfaces, Evaporation, Diffusion, Electron bombardment, Temperature, Carbides, Thorium compounds, Zirconium compounds, Uranium compounds, Diodes, Manufacturing methods, Life expectancy, Growth, Adsorption.

This report includes:
Bartol Research Foundation, Franklin Inst., Swarthmore, Pa.
DENSITY OF A THORIUM MONOLAYER FOR MAXIMUM THERMIONIC EMISSION, by W. E. Danforth and D. L. Goldwater. 16 May 60, 3p. incl. illus. table.
(Sponsored by the Air Force Cambridge Research Center)
(Reprint from Jnl. of Applied Physics 31:1715-1717, Oct 60)

AD-262 646 Div. 8, 26
(11 Sep 61) OTS price $22.25

Raytheon Co., Newton, Mass.
INDUSTRIAL PREPAREDNESS STUDY ON TRANSISTORS. SILCON POWER TRANSISTOR (DEVICE 15).
Final engineering rept. 12 Feb 58-31 Dec 60.
31 Dec 60, 433p. incl. illus. tables.
(Contract DA 36-039-sc-72710)
Unclassified report

DESCRIPTORS: *Transistors, Transistor amplifiers, Power amplifiers, Amplifiers, Silicon, *Manufacturing methods, Processing, Production, Design, Standardization, Quality control, Tests, Electrical properties.

The development and production of a bulk diffused silicon, NPN, power transistor (Device 15) was successfully completed. The bulk diffused approach was adopted because of its ease in providing satisfactory and reproducible transistor characteristics. A major design problem encountered was the base ring contact, which is alloyed through the base. Although the present unit meets the specification, the use of a nonpenetrating type would ensure higher breakdown voltages derived from the diffused collector to base junctions. The processing required for Device 15 and the machinery required for semiautomatic production does not differ materially in principle from the processing and machinery required for silicon alloyed devices. (Author)

AD-262 662 Div. 8
(8 Sep 61) OTS price $10.10

Tennessee U. Engineering Experiment Station, Knoxville.
THE THEORY OF SINGLE-RING CIRCULAR ANTENNA ARRAYS, by C. E. Hickman, H. P. Neff, and J. D. Tillman.
1 July 61, 121p. incl illus. tables, 14 refs.
(Scientific rept. no. 4)
(Contract AF 19(604)4967)
(AFCRL-542) Unclassified report

DESCRIPTORS: Antennas, *Dipole antennas, Integral equations, Impedance, Antenna radiation patterns, Electrical currents, Electric potential, Mathematical analysis, Bessel functions, Theory.

A detailed treatment is presented of the singlo-ring antenna array of identical, parallel dipoles. In the first chapter the boundary value problem describing the array is formulated in terms of simultaneous integral equations. It is shown that the introduction of symmetrical components reduces these to uncoupled integral equations, which can be solved by an iterative method. In the second chapter expressions for the terminal impedance are obtained, and an extensive set of tables giving numerical values of terminal impedance are given. In the third chapter a rigorous derivation is given of the radiation patterns of circular array. Methods are given for the synthesis of arbitrary patterns, and of directional patterns with equal side lobes. (Author)

AD-262 664 Div. 8
(8 Sep 61) OTS price $11.00

Electron Physics Lab., U. of Michigan, Ann Arbor.
RESEARCH ON CROSSED-FIELD ELECTRON DEVICES.
Semiannual progress rept. no. 9, 1 Dec 60-1 June 61,
by N. A. Masnari, M. H. Miller and others.
1 June 61, 132p. incl. illus.
(Contract DA 36-039-sc-78260)
(Rept. no. 02854 14-P)
Unclassified report

DESCRIPTORS: *Electron guns, Electromagnetic fields, Microwaves, S band, Propagation, *Microwave amplifiers, Microwave oscillators, *Backward-wave oscillators, *Magnetrons, *Space charges, Noise (Radio), Electron beams, Numerical methods and procedures, Electrons, Density, Electromagnetic waves.

The probe data obtained on the crossed-field stream analyzer are summarized. Detailed calculations on space-charge distribution and electron trajectories in a Kino crossed-field gun are analyzed. Some information on the relationship between beam laminarity and cathode width is presented for a flat cathode. The desirability of tilting the cathode is discussed. The determination of Kompfner dip conditions in an M-type amplifier is outlined along with nonlinear calculations on beating-wave gain. Additional experimental information on the S-band crossed-field amplifier was obtained and a new electron gun design is outlined. The analysis of noise generation and propagation in crossed-field devices is treated using both a density function method and a Monte Carlo calculation. Calculations of space-charge density and potential distributions in planar devices are given. An outline of the design of the experimental noise analyzer is presented. (Author)

AD-262 666 Div. 8, 25
(8 Sep 61) OTS price $3.60

Microwave Lab., Stanford U., Calif.
GENERAL STUDIES IN HIGH-POWER MICROWAVE CONCEPTS.
Scientific rept. no. 31, 1 Jan-31 Mar 61.
May 61, 38p. incl. illus. (ML rept. no. 823)
(Contract AF 19(604)1930)
(AFCRL-532) Unclassified report

DESCRIPTORS: *Microwave equipment, *Electron tubes, *Parametric amplifiers, Microwave amplifiers, Electron beams, *Electron guns, Electrostatics, *Plasma physics, Electromagnetic waves, Propagation, Theory, Scattering, Cesium, Impedance, Measurement, Microwaves, Harmonic analysis, Frequency multipliers, Plasma oscillations, Ferrites, Garnet, *Ferromagnetic materials, Amplifiers.

Contents:
Microwave Tube Studies: Investigation of the behavior of velocity-modulated electron beams in long gaps; Electron beam parametric amplifier; Crossed-field electron guns; Electrostatic beam-type parametric amplifier
Plasma Physics Studies: Electron beam interaction with a plasma; Plasma parametric amplifier; High-frequency diagnostic techniques for plasmas; Thermal plasmas; Plasma confinement; Nonlinear plasma theory; Noise in plasmas; Plasma diagnostic techniques; Electron beam interaction with a cesium plasma; Harmonic generation in plasmas; Studies of plasma oscillations
Ferrite Studies: Ferrite nonlinear resonance; Ferrite frequency multiplication

AD-262 694 Div. 8, 12
(11 Sep 61) OTS price $2.60

Bell Telephone Labs., Inc., North Andover, Mass.
QUARTZ CRYSTAL CONTROLLED OSCILLATORS.
Interim rept. no. 3, 1 Apr-30 June 61,
by W. L. Smith and W. J. Spencer. 10 July 61,
24p. incl. illus. table (Rept. no. 25335-B)
(Contract DA 36-039-sc-85373, Proj. 3G-26-05-001-01)
Unclassified report

DESCRIPTORS: *Quartz crystals, *Crystal oscillators, *Oscillator circuits, Circuits, Oscillators, *Frequency stabilizers, Stability, Tests, Acceleration, Temperature, Shock, Aging, Vibration, Test methods, Measurement, *Miniature electronic equipment, Standards, Reliability, Design, Crystal ovens, Test equipment, Guided missiles, Satellite vehicles.

The results of acceleration, thermal shock and aging tests on the 5-mc ruggedized version of the GA-10752 crystal unit are given. The units will now meet the stability required of them under vibration, shock, acceleration and aging. The ceramic-metal package has been found to be more gassy than glass bulbs, but improved cleaning techniques should remedy this. Several new aging facilities were finished which will allow the simultaneous aging of up to 16 crystal units with a precision of a few parts in 10 to the 10th power per day. The measurement of aging rates of this order is possible through the use of double ovens, improved voltage sensitivity in the oscillator circuits and an Atomicron as a primary frequency standard. Aging results on a few precision crystal units are given. A preliminary design of a ruggedized, miniature frequency standard is presented. The units will occupy approximately 100 cubic inches and should supply a frequency stable to less than 1 pp 10 to the 9th power per day after a warm up period of two to three weeks. The development of smaller, higher frequency crystal units for future miniature frequency standards was started. (Author)

AD-262 707 Div. 8, 25
(11 Sep 61) OTS price $4.60

Melabs., Palo Alto, Calif.
INVESTIGATION OF MICROWAVE NON-LINEAR EFFECTS UTILIZING FERROMAGNETIC MATERIALS.
Quarterly progress rept. no. 3, 3 Apr-2 July 61,
by Roy W. Roberts. 18 July 61, 37p. incl. illus.
(Contract DA 36-039-sc-87412)
Unclassified report

DESCRIPTORS: *Ferromagnetic materials, *Ferrites, *Garnet, Microwaves, Nonlinear systems, *Frequency multipliers, *Microwave amplifiers, Microwave equipment, Electronic equipment, Design, Crystals, Single crystals, Yttrium compounds, Iron compounds, Electromagnetic properties, Nickel compounds, Zinc compounds.

Investigation was continued of the non-linear effects in the microwave properties of ferrites and ferrimagnetic garnet materials. Emphasis was placed on determining parameters for efficient 2-mm wave generation and on determining feasibility and applications of ferrite parametric amplification. In addition, the feasibility of cw harmonic generation will be investigated. Two millimeter wave generation experiments using single crystal YIG and nickel-zinc ferrite are described. Slightly under 20 w of power was generated. Extensions in the theory of longitudinally pumped ferrite amplifiers are given. Measurements of the tuning curves and anisotropy of the signal and idler modes of a 21-kmc ferrite amplifier are described. (Author)

AD-262 709 Div. 8, 6, 5
(11 Sep 61) OTS price $4.60

Institute of Science and Tech., U. of Michigan, Ann Arbor.
THE RUBY MASER. A PRACTICAL MICROWAVE AMPLIFIER.
Rept. on Proj. Michigan,
by J. J. Cook, M. E. Bair, and L. G. Cross.
Sep 61, 42p. incl. illus. (Rept. no. 2900-288-T)
(Contract DA 36-039-sc-78801)
Unclassified report

DESCRIPTORS: *Masers, Ruby, Microwave amplifiers, Amplifiers, Signal-to-noise ratio, *Radar tracking, X band, Radiometers, Radar receivers, *Search radar, *Radio astronomy, Preamplifiers, Effectiveness, Noise (Radio), Microwave equipment, Communication equipment, Design, Extraterrestrial radio waves, Detection, Telescopes.

The ruby maser is shown to be a stable, reliable, low-noise microwave amplifier. Results indicate that performance improvements up to 14 db can easily be obtained. Test results of an engineering and development program to package the maser for use in a radio telescope demonstrated the feasibility of using the ruby maser as a compact, practical, and dependable field unit. The maser's theory of operation is discussed and its potential use for ground surveillance, missile and satellite tracking, and space communications is described. (Author)

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-262 711 Div. 8
(11 Sep 61) OTS price $9.10

Motorola, Inc., Scottsdale, Ariz.
UHF PHASE SHIFTER.
Final rept.,
by N. G. Sakiotis and D. E. Allen. 15 Mar 61, 103p. incl. illus. tables, 13 refs. (Rept. no. WF-2488)
(Contract AF 19(604)6171)
(AFCRL-391) Unclassified report

DESCRIPTORS: *Phase shifters, Ultra high frequency, Ferrites, Garnet, *Ferromagnetic materials, Coaxial cables, *Transmission lines, Helixes, Wave transmission, Design, Mathematical analysis, Effectiveness, Materials.

The exploratory development is described of a slow-wave UHF ferrite phase shifter. The real and imaginary parts of the initial permeability are given for a large percentage of the commercially available ferrites and garnets. The frequency range of the spectra is 400 to 1000 megacycles. From the results of the spectra, the materials are categorized into one or more of five possible low-loss phase shifting regions. The adaptability of periodic coaxial, periodic strip, and helical transmission lines for use in UHF ferrite phase shifters is discussed. In general, it was found that the periodic strip transmission line was best suited for use in a UHF ferrite phase shifter. It is also concluded that, even though considerable gains in the phase shift per unit can be realized with slow-velocity structures, it does not necessarily follow that better phase shifters can be realized through their use. A short discussion on the expected behavior of the absorption loss for variations in ambient temperature is presented and experimental data are given to verify the theory. (Author)

AD-262 720 Div. 8, 22
(11 Sep 61) OTS price $.50

Naval Ordnance Lab., White Oak, Md.
CHARACTERIZATION OF SQUIB MK 1 MOD 0. 5-MEGACYCLE RF SENSITIVITY FOR LONG DURATION PULSES,
by C. Goode and I. Kabik. June 61, 9p. incl. illus. (Rept. no. NOLTR 61-24)
Unclassified report

DESCRIPTORS: *Electric detonators, *Electric igniters, Sensitivity, Fire control systems, Hazards, Radiation hazards, Electromagnetic waves, Radiofrequency pulses, Naval ordnance, Tests, Test equipment, Test methods.

The response of the Squib Mk 1 Mod 0 to 5-Megacycle constant current (RMS) has been extended to long input times where the current amplitude for firing reaches a minimum asymptotic value. For a current amplitude of 374 milliamperes a pulse width of 155 milliseconds was found necessary to obtain 50-percent fires. When the current was allowed to flow for approximately 10 seconds (essentially steady state) a lower firing level of 308 milliamperes for 50-percent response was determined. These values are consistent with previous data obtained at 5 megacycles for shorter pulse times and also with DC constant current firing data. (Author)

AD-262 725 Div. 8
(11 Sep 61) OTS price $8.10

Radio Condenser Co., Camden, N. J.
TEMPERATURE COMPENSATING TRIMMER.
Final rept. 1 Mar-25 Aug 61,
by E. J. Caron. 25 Aug 61, 86p. incl. illus. tables.
(Contract NObsr-81173)
Unclassified report

DESCRIPTORS: *Capacitors, *Variable capacitors, Temperature, Specifications, Design.

Three temperature coefficient trimmers were developed with insertion capacities of 2.0, 6.5, and 10.0 pf. Five of each were built and evaluated. Each of these is adjustable for T.C.'s (temperature compensations) in excess of ±2000 ppm/C. The maximum T.C. adjustment in many of the units gave results up to 3000 ppm/C. The design satisfies the goals of voltage (1000 V DC), altitude (50,000 ft.), T.C. (±2000 ppm/C, shock (50 G's - 11 milliseconds), insulation resistance (10,000 megohms), Q (500), and operating range (-55 C to +150 C). Vibration was checked up to 55 c only, and was satisfactory. Torque was below 2 inch ounces on some units, but this can be overcome. Insertion capacity variations over the T.C. range at ambient were over the .05 pf specification. In the final stages of this development it became necessary to modify the evaluation program as the contract commitments were exceeded. However, a feasible design was achieved. Some refinements can be incorporated. Recommendations are made. (Author)

AD-262 763 Div. 8
(12 Sep 61) OTS price $1.60

Case Inst. of Tech., Cleveland, Ohio.
NOTE ON INPUT SUSCEPTANCE OF A DISK LOADED WAVEGUIDE,
by Wilhelm H. Eggimann. 1 June 61, 12p. incl. illus. table (Scientific rept. no. 25)
(Contract AF 19(604)3887)
(AFCRL-574) Unclassified report

DESCRIPTORS: *Waveguides, Disks, *Electromagnetic fields, *Diffraction, X band, S band, Electrical properties, Microwave networks, Transmission lines, Measurement, Foams, Polymers.

The input susceptance of a disk loaded waveguide is re-evaluated. Despite considerable care which was taken in checking the theoretical results experimentally, some discrepancies were noted. In the meantime some of the calculations have been rechecked but no error was discovered. However, it turned out that the polyfoam support and the sliding short of the measuring apparatus gave rise to an experimental error, which at least for the smaller disks accounted fully for the discrepancies mentioned earlier. All the measurements were therefore repeated. A summary of the procedure is given. (Author)

AD-262 772 Div. 8, 6
(13 Sep 61) OTS price $2.60

HRB-Singer, Inc., State College, Pa.
DATA ANALYSIS AND LONG RANGE INTERCEPT TECHNIQUES.
Quarterly progress rept. no. 1, for 24 Mar-30 June 61 on Research and Development on Phase Shift Amplifiers in the 50-1100 MC Band,

by E. H. Wintermute, IV. 30 June 61, 25p. incl. illus. (Rept. no. 290-1)
(Contract DA 36-039-sc-87272)
Unclassified report

DESCRIPTORS: *Phase shifters, *Parametric amplifiers, Amplifiers, Microwave amplifiers, Very high frequency, Ultra high frequency, Crystal detectors, *Radio interception, *Radar interception, Noise (Radio), Design, Broadband, Impedance, Measurement.

The results of experimental work on the phase shift amplifier in the 50 - 150 MC Band and the 250 - 500 MC band are presented. The problems encountered in the development of a 50 - 150 MC model into an experimental field unit, and where possible, the probable causes of these technical difficulties are discussed. (Author)

AD-262 774 Div. 8, 25
(13 Sep 61) OTS price $1.60

General Electric Co., Schenectady, N. Y.
INVESTIGATION OF VARIOUS ACTIVATOR-REFRACTORY SUBSTRATE COMBINATIONS,
by J. H. Affleck. 16 Mar 61, 13p. incl. tables.
(Scientific rept. no. 11)
(Contract AF 19(604)4093)
(AFCRL-140) Unclassified report

DESCRIPTORS: *Cathodes (Electron tubes), Electron tubes, *Refractory materials, Thermionic emission, Evaporation, Temperature, Space charges, *Barium compounds, Barium, Silicides, Strontium compounds, Calcium compounds, Tungsten, Tungsten compounds, Tests, Measurement.

Two cathode systems were examined that have rather attractive emission and evaporation characteristics. The composition of these systems and several others are discussed and the results reported. The major factors affecting the temperature variation of the work function are mentioned. The effects of space charge on the data are to be examined further. (Author)

AD-262 776 Div. 8, 25
(12 Sep 61) OTS price $1.60

General Electric Co., Schenectady, N. Y.
INVESTIGATION OF VARIOUS ACTIVATOR-REFRACTORY SUBSTRATE COMBINATIONS,
by J. H. Affleck, 25 May 61, 11p. incl. table.
(Scientific rept. no. 12)
(Contract AF 19(604)4093)
(AFCRL-501) Unclassified report

DESCRIPTORS: *Cathodes (Electron tubes), Electron tubes, *Thermionic emission, *Field emission, Temperature, Work functions, Evaporation, Electrical properties, Surface properties, Space charges, Measurement, *Refractory materials, Tungsten compounds, Barium compounds, Calcium compounds, Silicides, Strontium compounds, Tests.

Some aspects of the nonlinearity of the temperature dependence of the work function are discussed. Two factors that may cause considerable variation are the surface uniformity of the emitter and the space charge effects in determining the zero field emission. The characteristics of several dispenser cathode systems are reported. (Author)

AD-262 807 Div. 8, 26
(12 Sep 61) OTS price $4.60

Pacific Semiconductors, Inc., Lawndale, Calif.
DIODES, CLIPPER AND HOLD-OFF, HIGH VOLTAGE (10-20 KV).
Quarterly rept. no. 3, 1 Jan-1 Apr 61,
by E. E. Maiden, W. F. Schnepple and F. J. Snee.
1 Apr 61, 45p. incl. illus. tables.
(PSI rept. no. 4000: 7-2Q)
(Contract DA 36-039-sc-85070)
Unclassified report

DESCRIPTORS: *Diodes, Semiconductors, *Subminiature electronic equipment, Design, *Manufacturing methods, Processing, Silicon, Clipper circuits, Packaged circuits, Switching circuits, Electronic circuits, Electrical properties, Life expectancy, Reliability, Tests, Electrostatic capacitance, Test methods.

Emphasis was placed on the investigation and evaluation of the recovery characteristics of single and multiple junction diodes for clipper diode application. The diode design problem was analyzed from the standpoint of both junction design theory and technological limitations. Considerable effort was expended in experimental testing and in making empirical correlation with individual and series-connected silicon junction design characteristics. In practice, there is a technological limitation with regard to forward recovery for clipper diodes meeting the basic dc electrical characteristics. This limit appears to be of the order of .5 microseconds for diffused junction diodes. However, recovery time measurements depend upon the test circuit, test conditions, and definition of recovery time. (Author)

AD-262 830 Div. 8
(12 Sep 61) OTS price $7.60

Research-Cottrell, Inc., Bound Brook, N. J.
MOVEMENT OF AIR IN THE ELECTRIC WIND OF THE CORONA DISCHARGE,
by M. Robinson. 8 June 60, 66p. incl. illus. table, 109 refs. (Technical paper no. TP 60-2; Access no. 3613)
(Contract NObs-77164)
Unclassified report

DESCRIPTORS: *Gas flow, Electric discharge, Electrostatic fields, Blowers, Air, Motion, Gas ionization, *Kinetic theory, *Electromechanical converters, Tests, *Electrical corona, Velocity, Electrons.

The mechanism of gas movement in the electric wind is considered and an approximate theory presented which relates relevant electrical and mechanical quantities. Among others, the following relationships are shown to hold: Velocity is a linear function of voltage and is proportional to the square root of current; if the density of the gas is not too low the efficiency of electrokinetic conversion is proportional to the density and the velocity is independent of the density; near sparkover efficiency is independent of voltage; velocity increases slowly as blowers are stacked in series; the rate of ozone generation in the corona discharge in air is an increasing function of electric-wind velocity. The forms of the equations relating these variables are found to hold in a variety of cases even though assumed boundary conditions are not observed experimentally. The practical utility of an electrostatic blower is limited

by an efficiency of operation in the neighborhood of one percent. A survey of the literature and an extensive bibliography are included. (Author)

AD-262 846 Div. 8
(12 Sep 61) OTS price $4.60

Syracuse U. Research Inst., N. Y.
A CRITICAL STUDY OF LINEAR ARRAYS WITH EQUAL SIDE LOBES,
by Mark T. Ma and David K. Cheng. 1 Apr 61, 42p. incl. illus. 11 refs. (Task rept. no. 12; Rept. no. EE 492-6104T12)
(Contract AF 30(602)1640, Proj. 4506)
(RADC TN 61-136) Unclassified report

Presented at the International Convention of the Institute of Radio Engineers, New York, N. Y., 23 March 1961.

DESCRIPTORS: *Antennas, Antenna radiation patterns, Lobing, Mathematical analysis, Linear systems.

New and generalized expressions for the array factor of all physically realizable linear antenna arrays with progressive phase shifts are introduced. Based on these generalized expressions, a new way of synthesizing arrays with equal side lobes is available. It applies equally well to both broadside and endfire arrays, which may have either even or odd number of elements with unrestricted element spacing. No manipulations with transcendental functions are necessary, and the final expressions show a clear relationship between element excitations and null locations in the radiation pattern. Directive gain can be calculated directly from the array factor. Pattern optimization and sensitivity problems are discussed and typical examples are given. (Author)

AD-262 848 Div. 8, 15
(12 Sep 61) OTS price $5.60

Syracuse U. Research Inst., N. Y.
THREE PROOFS FOR THE FUNDAMENTAL THEOREM OF INFORMATION THEORY DISCRETE MEMORYLESS CHANNELS,
by F. M. Reza. June 61, 54p. (Scientific rept. no. 3; Rept. no. EE 747-6109SR3)
(Contract AF 19(604)6169)
(AFCRL-503) Unclassified report

DESCRIPTORS: Theory, Communications theory, *Channel selectors, Coding, Transmission, *Mathematics, *Real variables, Measure theory, *Information theory.

The fundamental theorem of information theory for discrete memoryless channels is treated. Subsequent to some preliminary preparations, describing the decision scheme and average error probability, three proofs of the basic theorem are presented: Feinstein's Proof, Shannon's Proof, and Wolfowitz's Proof. A discussion of the bounds of error probability and their relations to the word length and the converse of the fundamental theorem is included. (Author)

AD-262 913 Div. 8, 12, 25
(13 Sep 61) OTS price $22.25

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
INVESTIGATION OF THE NATURAL INTERFERENCE EFFECTS UPON HIGH THRUST PILOTED AND PILOTLESS VEHICULAR ELECTRONICS SYSTEM PERFORMANCE. PART I. VEHICLE INDUCED INTERFERENCE. PART II. INTERFERENCE DUE TO UNDISTURBED ENVIRONMENT. PART III. CONCLUSION AND RECOMMENDATIONS.
Aug 61, 416p. incl. illus. tables.
(Contract AF 33(616)6957, Proj. 4357)
(WADD TR 61-191, vol. 1)
Unclassified report

DESCRIPTORS: Guided missiles, Surface to surface, Satellite vehicles, Hypervelocity vehicles, *Electronic equipment, *Interference, Noise (Radio), Airborne, Radio signals, Radio transmission, Ionospheric propagation, Attenuation, Absorption, Ionosphere, Atmosphere, Telemetering data, Communication systems, Plasma physics, Gas ionization, Shock waves, Boundary layer, Solar energy, Cosmic rays, Extraterrestrial radio waves, Solar disturbances, Ionospheric disturbances, Aurorae, Hypervelocity vehicles, Space environmental conditions.

The severity of natural interferences on vehicular electronic systems performance is evaluated. The natural interferences include the two major types that are of importance for ballistic vehicles, boost-glide vehicles, sustained flight vehicles, and space vehicles. These interferences are the vehicle-induced types at hypersonic speeds, including the effects of the plasma sheath and effect of the hot plasma on antenna and that due to the undisturbed environment as, absorption and attenuation, extra-terrestrial noise, radiation environment effects, and others. Vehcile induced environments for a number of vehicle shapes for ballistic types are given. Comparison of telemetery flight data with these theoretical predictions are made. (Author)

AD-262 916 Div. 8, 26
(13 Sep 61) OTS price $2.60

International Resistance Co., Philadelphia, Pa.
RESISTORS, VARIABLE (FILM TYPE).
Quarterly progress rept. no. 12, 1 Mar-31 May 61, by John Woods. 31 May 61, 22p. incl. illus. tables.
(Contract DA 36-039-sc-75981)
Unclassified report

AD-262 925 Div. 8, 25
(14 Sep 61) OTS price $1.10

Lincoln Lab., Mass. Inst. of Tech., Lexington.
FERROMAGNETIC RESONANCE IN YTTRIUM IRON GARNET FILM,
by R. F. Soohoo. 28 Aug 61, 2p. illus. (Rept. no. 53G-0065)
(Contract AF 19(604)7400)
Unclassified report

DESCRIPTORS: *Garnet, Films, Thin films, Crystals, Single crystals, Yttrium compounds, Iron compounds, Ferromagnetism, Paramagnetic resonance, Resonance absorption, Electromagnetic properties, Ferromagnetic materials, Nuclear spins.

DESCRIPTORS: *Variable resistors, Resistors, Films, Production, Manufacturing methods, Carbon alloys, Gold alloys, Nickel alloys, Silver alloys, Processing, Carbon resistors, Design.

Accelerated tests were performed to determine the effect of alternate cycles of moisture and elevated temperature on various center terminal and contact spring materials. Premalloy (a gold alloy) will be used as center terminal material for 100 ohm pots; whereas, nickel-silver will be used for all other ranges required. RV11, (1-piece), RV11, (3-piece), and RV12 elements were processed and sent for assembly into housings. The IRC element facility is approximately 92% complete. The CTS facility is approximately 90% complete. (Author)

AD-262 927 Div. 8
(13 Sep 61) OTS price $8.10

Motorola, Inc., Chicago, Ill.
CRYSTAL FILTERS.
Quarterly progress rept. no. 4, 1 Jan-1 Apr 61,
by S. Malinowski and D. Schennberg. 1 Apr 61,
84p. incl. illus. tables.
(Contract DA 36-039-sc-85300)
Unclassified report

DESCRIPTORS: *Crystal filters, *Very high frequency filters, *Band-pass filters, Broadband, Very high frequency, Design, Circuits, Crystals, Lattices, Theory, Electrical networks.

The inductively coupled lattice equivalent was found both theoretically and experimentally applicable to the construction of the VHF wideband crystal filters specified by the contract. A step by step design procedure is illustrated. A complete description of the filter including component values and test equipment is given; all the test data are presented. The experimental results of a filter with crystals exhibiting spurious manifestations are compared with the results of a theoretical study. The behavior under high drive of a crystal filter is investigated theoretically and experimetally. Methods of measuring crystal parameters and simple tuning procedures are described. (Author)

AD-262 928 Div. 8, 2
(13 Sep 61) OTS price $.50

National Aeronautics and Space Administration, Washington, D. C.
ROCKET MEASUREMENT OF A DAYTIME ELECTRON DENSITY PROFILE UP TO 620 KILOMETERS,
by J. E. Jackson and S. J. Bauer. Sep 61, 6p. incl. illus. tables (NASA Technical note no. D-413)
Unclassified report

Also available from NASA, Wash. 25, D. C. as NASA Technical note no. D-413.

DESCRIPTORS: *Electrons, *Density, Measurement, Rockets, Rocket trajectories, Test methods, Ionosphere, Ionospheric propagation, Radio waves.

On April 27, 1961 at 1502 EST a four-stage research rocket was fired from Wallops Island, Virginia, to measure the ionospheric electron density distribution by means of Seddon's CW propagation technique. This experimental technique is based upon the dispersive Doppler effect measured at two harmonically related frequencies, in this case f = 12.267 Mc and 6f = 73.6 Mc. The electron density profile measured above the peak of the F2 region is representative of a diffusive-equilibrium distribution in an isothermal ionosphere having a temperature of 1640 + or - 90 K. This result, when compared with satellite and other data, indicates that the upper ionosphere is in thermodynamic equilibrium. (Author)

AD-262 940 Div. 8
(13 Sep 61) OTS price $8.60

RCA Defense Electronic Products, Camden, N. J.
DEVELOPMENT OF INDUCTOR MICROELEMENTS.
Formal engineering rept. on Micro-Module Production Program.
17 Mar 58, 100p. incl. illus. tables.
(Contract DA 36-039-sc-75968)
Unclassified report

DESCRIPTORS: Miniature electronic equipment, Subminiature electronic equipment, Production, Manufacturing methods, Reliability, Tests, Design, Coatings, Test equipment, *Radiofrequency coils, Magnetic cores, Ferrite cores, Radiofrequency transformers, Pulse transformers, Research program administration.

The inductor task under the Initial Program had three broad objectives; to demonstrate manufacturing feasibility, to demonstrate microelement-inductor reliability, and to establish sources of supply for cores and inductors. All three of these broad objectives were achieved. During the micro-module assembly process all microelements were coated with silicone elastomer, DC-271, as an impregnant and cement to prevent direct adhesion of the encapsulant to the components to reduce effects of the encapsulant on temperature coefficients. A Teflon coating on the unwound ferrite core further reduced this effect. Considerable work was devoted to inductor winding methods. Early attempts to wind rf transformers gave unsatisfactory results due to faulty placement of secondary windings. Use of a special core holder in conjunction with a segment winder improved both the uniformity of angle occupied by the primary, and improved the uniformity of locating the secondary start. All types of cores were wound with a total error not exceeding + or - degrees. (Author)

AD-262 968 Div. 8
(1 Sep 61) OTS price $1.60

Smyth Research Associates, San Diego, Calif.
A STUDY OF IONOSPHERIC FIELD ALIGNED SCATTER.
Quarterly progress rept. no. 5, Apr-June 61,
by L. A. Morgan. July 61, 18p. incl. illus.
(Rept. no. SRA-207)
(Contract AF 33(616)6991)
Unclassified report

DESCRIPTORS: *Radar signals, *Radio waves, Very high frequency, *Scattering, Ionospheric propagation, Radar transmitters, Radar receivers, Ionosphere, Terrestrial magnetism.

AD-262 999 Div. 8
(15 Sep 61) OTS price $1.60

Clevite Corp., Cleveland, Ohio.
STUDY OF METHODS FOR IMPROVING QUALITY OF SYNTHETIC QUARTZ.
Quarterly technical rept. no. 3, 16 Apr-15 July 61,
by D. R. Hale and A. E. Carlson. 28 July 61, 16p. incl. illus. tables.
(Contract DA 36-039-sc-87372, Proj. 3A99-15-021-02)
Unclassified report

DESCRIPTORS: *Quartz crystals, Quartz resonators, Growth, Quality control, Processing, Preparation, Production, Manufacturing methods, Additives, Sodium compounds, Carbonates, Spectrographic analysis, X-ray diffraction analysis.

Two runs in 250-ml platinum-lined vessels are in operation. They involve swept Z-growth seeds and 0.83 sodium carbonate solution containing 1 to 10 ppm aluminum and otherwise of exceptional purity. One run has swept Z-growth quartz as feed, the other has Corning 100% Fused Silica. In all, eight growth experiments are running. One run emphasizes growth at low temperature

difference (13 C) in the sodium carbonate-bicarbonate solution that yielded high Q material as reported under the previous contract. Another emphasizes study of a baffle and feed-holding basket. A preliminary test in a platinum-lined vessel, yielded quartz of high visual quality. A parallel-polarized light apparatus was developed for study of strained areas in quartz plates. Photographs demonstrated the correlation of strained areas with areas of localized radiation darkening. Complete correlation with dislocation patterns is awaiting successful development of X-ray techniques. (Author)

AD-263 056 Div. 8, 15
(18 Sep 61) OTS price $1.60

Electronic Defense Labs., Mountain View, Calif.
A GENERALIZATION OF WOODWARD'S THEOREM AND THE SPECTRUM OF A HIGH HARMONIC OF A SINUSOID PLUS NARROW-BAND GAUSSIAN NOISE,
by Nelson M. Blachman. 28 Mar 61, 12p. (Technical memo. no. EDL-M367)
(Contract DA 36-039-sc-87475)
Unclassified report

DESCRIPTORS: *Harmonic analysis, *Radio waves, Radio signals, *Noise (Radio), Narrowband, Frequency modulation, Amplitude modulation.

Woodward's theorem asserts that the power spectrum of a slowly frequency-modulated signal is given by the first-order probability density of the modulation. It can be extended to cover the case where there is slow amplitude modulation as well (correlated or uncorrelated and deterministic or random) by weighting each frequency by the mean-square amplitude associated with it. The modulation can be regarded as slow if its bandwidth is small compared to the frequency excursion. If a narrow-band waveform is multiplied in frequency up to a high harmonic, its spectrum becomes broad by comparison with its modulating frequencies, and this extension of Woodward's theorem provides an easy way of determining the spectrum. It is applied to the case of a sinusoid plus narrow-band gussian noise that has been passed through a power-law device to generate a high harmonic. The power spectrum is determined and its accuracy is estimated. Consideration is given to the accuracy with which the spectral density can be measured in a given time and to its use as an indicator of the presence of a signal. In the cases susceptible to analysis, the optimum harmonic to use for this purpose appears to be the first. (Author)

AD-263 062 Div. 8, 7
(18 Sep 61) OTS price $1.60

Hallicrafters Co., Chicago, Ill.
TIME SIGNAL GENERATOR GROUP QRC-37F(T) (SUPPLEMENT).
8 Sep 61, 12p. incl. illus.
(Contract AF 33(604)29477)
Unclassified report

DESCRIPTORS: *Signal generators, Time signals, *Handbooks, *Instruction manuals, Installation, Operation, *Power supplies, Power amplifiers, Voltage regulator tubes, Diodes, Electron tubes, Electronic circuits, Design, Time delay relays, Time switches.

Installation and operation information for time signal generator group QRC-37F(T), as modified are presented. The original QRC-37F(T) power supply was operated from a dc power source of 23-29 volts. At 27.5 volts dc, the power requirement was 350 watts. The modified power supply will operate from an ac power source of 108-121 volts, 380-420 cps. At 115V ac, the power requirement is 143 watts. The 23-29 volt dc power source is still utilized for the operation of the crystal oven, time delay relay switch, and amplifier tube filaments. The dc power requirement is 100 watts at 27.5 volts. Mechanical changes are incorporated that result in a better layout of components and hardware. (Author)

AD-263 084 Div. 8, 2
(18 Sep 61) OTS price $.50

National Aeronautics and Space Administration, Washington, D. C.
SOLAR NADIO PHENOMENA AND THEIR PHYSICAL INTERPRETATION,
by J. F. Denisse. Sep 61, 10p. incl. illus. table (NASA Technical translation no. F-72 of Les Phenomenes Radioelectriques Solaires et Leur Interpretation Physique)
Unclassified report

Presented at the 13th General Assembly of the Union Radio Scientifique Internationale in London, Sep 12, 1960.

Also available from NASA, Wash. 25, D. C. as NASA Technical translation no. F-72.

DESCRIPTORS: *Radio astronomy, *Solar flares, Intensity, *Particles, Ejection, Magnetic fields, Propagation, Wave transmission, *Magnetohydrodynamics, Radio transmission, Astrophysics.

The various types of waves that can arise in the coronal plasma and the conditions for their escape beyond the corona are discussed. The centimeter bursts of radiation and type IV bursts can be interpreted as synchrotron radiation of relativistic electrons. The bursts of type III and type II are most probably due to the excitation of oscillations of the coronal plasma by high energy particles; but whereas the particles responsible for type III seem to pass through the corona freely, those which radiate type II are probably trapped in a magneto-dynamic wave. Radio storms are probably also due to the excitation of oscillations of the coronal plasma by the particles initially ejected during an eruption, these particles remaining trapped for several days in the permanent magnetic configurations near the sun. (Author)

AD-263 089 Div. 8
(18 Sep 61) OTS price $5.60

Naval Ordnance Lab., Corona, Calif.
A TWO-ELEMENT HALFWAVE VLF RECEIVING ANTENNA ARRAY SYSTEM,
by Mervyn C. Hoover, Jr. 15 July 61, 52p. incl. illus. tables, 19 refs. (NOLC rept. no. 547)
Unclassified report

DESCRIPTORS: *Antennas, *Loop antennas, Very low frequency, Mobile, Mathematical analysis, Design, Phase measurement, *Antenna radiation patterns, Measurement, Radio receivers, Radio transmitters, Very high frequency, Frequency modulation, Phase shifters, Communication systems, Impedance, Angle of arrival, *Radio transmission.

A description is presented of a two-element half-wave receiving antenna array system developed for use at very low frequencies (VLF). Each of the two elements consists of a loop-vertical antenna combination; one of the elements is located at a fixed site, and the other is housed in a truck which is moved to different points on a circle of one-half-wavelength radius about the fixed element. The mathematical basis of the system is presented, together with a full description of the system and the method used and results obtained in measurements of its antenna pattern. It is concluded that the system represents a feasible solution to the problem of obtaining both directivity and mobility in a VLF antenna array. (Author)

9. FLUID MECHANICS

AD-262 310 Div. 9, 1
(1 Sep 61) OTS price $.50

National Aeronautics and Space Administration, Washington, D. C.
STABILITY AND CONTROL CHARACTERISTICS OF A MODEL OF AN AERIAL VEHICLE SUPPORTED BY FOUR DUCTED FANS,
by Lysle P. Parlett. Aug 61, 18p. incl. illus. (NASA Technical note no. D-937)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note no. D-937.

DESCRIPTORS: *Flying platforms, Ground effect, Stability, Control, *Aerodynamics, *Subsonic flow, Model tests, Control systems, Roll, Pitch, Guide vanes, Oscillation, Shrouded propellers.

Tests were made in both hovering and forward flight with a model having four ducted fans which provided the sole source of lift and propulsion. The ducts were arranged in a rectangular pattern and were fixed with respect to the airframe so that their axes of revolution were vertical for hovering flight. In hovering flight the model had unstable oscillations in pitch and roll which could be completely stabilized by the use of artificial damping. In forward flight, the tilt angle and pitching moment required for trim were undesirably large. Both of these quantities were reduced when a cascade of turning vanes was used beneath the forward ducts, but the power penalty imposed by the vanes was large. (Author)

AD-262 311 Div. 9, 1
(1 Sep 61) OTS price $1.50

National Aeronautics and Space Administration, Washington, D. C.
STATIC LONGITUDINAL CHARACTERISTICS AT HIGH SUBSONIC SPEEDS OF A COMPLETE AIRPLANE MODEL WITH A HIGHLY TAPERED WING HAVING THE 0.80 CHORD LINE UNSWEPT AND WITH SEVERAL TAIL CONFIGURATIONS,
by Kenneth W. Goodson. Aug 61, 57p. incl. illus. tables (NASA Technical note no. D-949; Supersedes Research memo. no. L56J03, AD-119 301)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note no. D-949.

DESCRIPTORS: *Wing-body configurations, *Aerodynamics, *Transonics, *Subsonic flow, Stability, Stability (Longitudinal), Moments, Lift, Drag, Model tests, Tails, Aspect ratio, Tests.

An investigation was made at high subsonic speeds of a complete model having a highly tapered wing and several tail configurations. The basic aspect-ratio-4.00 wing had zero taper and an unswept 0.80 chord line. Several aspect-ratio modifications to the basic wing were made by clipping off portions of the wing tips. The complete model was tested with a chordplane tail, a T-tail, and a biplane tail (combined T-tail and chord-plane tail). The model was tested in the Langley high-speed 7- by 10-foot tunnel at Mach numbers from 0.60 to 0.92. The data show that, when reduced to the same static margin, all the tail configurations tested on the model provided fairly good stability characteristics, the biplane tail giving the best over-all characteristics as regards pitching-moment linearity. Changes in static margin at zero lift coefficient with Mach number were small for the model with these tails over the Mach number range investigated. (Author)

AD-262 312 Div. 9
(1 Sep 61) OTS price $2.25

National Aeronautics and Space Administration, Washington, D. C.
STATIC LATERAL CHARACTERISTICS AT HIGH SUBSONIC SPEEDS OF A COMPLETE AIRPLANE MODEL WITH A HIGHLY TAPERED WING HAVING THE 0.80 CHORD LINE UNSWEPT AND WITH SEVERAL TAIL CONFIGURATIONS,
by Kenneth W. Goodson. Aug 61, 98p. incl. illus. table (NASA Technical note no. D-950; Supersedes Research memo. no. L57I13, AD-145 156)
Unclassified report

Also available from NASA, Wash. 25, D. C. as NASA Technical note no. D-950.

DESCRIPTORS: *Airplane models, Aerodynamics, *Stability (Lateral), *Wings, Stabilizers (Horizontal tail surface), *Tails, Fuselages, Subsonic flow, Transonic flow, Wing-body configurations, Wind tunnels, Model tests, Pitch.

An investigation was made at high subsonic speeds of a complete model having a highly tapered wing and several tail configurations. The aspect-ratio-3.50 wing had a taper ratio of 0.067 and an unswept 0.80 chord line. The complete model was tested with a wing-chord-plane tail, a T-tail, and a biplane tail (combined T-tail and wing-chord-plane tail). The model was tested in the Langley high-speed 7- by 10-foot tunnel at Mach numbers from 0.60 to 0.92 over a range of angle of attack of about or - 20 degrees and a range of sideslip of -15 degrees to 13 degrees. Some data were obtained with the horizontal stabilizer deflected. A few tests were also made with the wing tips clipped to an aspect ratio of 3.00. The data show that shock-interference effects between the tail surfaces (T-tail) can have considerable influence on the directional stability and effective dihedral. (Author)

Division 9 - FLUID MECHANICS

AD-262 313 Div. 9
(1 Sep 61) OTS price $1.25

National Aeronautics and Space Administration, Washington, D. C.
APPLICABILITY OF MIXING LENGTH THEORY TO A TURBULENT VORTEX SYSTEM,
by Robert G. Ragsdale. Aug 61, 41p. incl. illus, table, 15 refs. (NASA Technical note no. D-1051)
Unclassified report

Also available from NASA, Wash. 25, D. C. as NASA Technical note no. D-1051.

DESCRIPTORS: *Vortices, *Vortex generators, Pressure, Turbulent flow, Nuclear propulsion, Aerodynamics, Hydrodynamics, Reynolds number, Mathematical analysis, Turbulence.

The ability of mixing length theory to correlate vortex data is evaluated. Expressions are derived for eddy diffusivity by applying the techniques of von Karman and Prandtl which have been established for pipe flow. Total and static pressures were measured from the outer radius to the exhaust-nozzle radius of a vortex generator for a range of mass flows. These data are combined with Navier-Stokes solutions for this region of a compressible vortex to determine turbulent Reynolds numbers. The Reynolds number is related to Prandtl and Karman functions for various assumed boundary conditions, and the experimental data are used to determine the usefulness of these expressions. The following conclusions were reached: (1) mixing length functions developed by applying von Karman's similarity hypothesis to vortex motion correlate the data better than do Prandtl functions obtained with the assumption that mixing length is proportional to radius; (2) some of the expressions developed do not adequately represent the experimental data; (3) the data are correlated with acceptable scatter by evaluating the fluid radial inertia at the outer boundary and the shear stress at the inner boundary; and (4) the data are best correlated by a modified Karman expression which includes an effect of radial inertia, as well as shear stress, on eddy diffusivity. (Author)

AD-262 410 Div. 9, 27, 1
(4 Oct 61) OTS price $.50

National Aeronautics and Space Administration, Washington, D. C.
EFFECT OF MULTIPLE-NOZZLE GEOMETRY ON JET-NOISE GENERATION,
by Vern G. Rollin. Sep 61, 17p. incl. illus. tables, 11 refs. (NASA Technical note D-770)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note D-770.

DESCRIPTORS: *Turbojet engines, *Jet engine noise, *Airplane engine noise, Reduction, *Turbojet exhaust nozzles, Exhaust nozzles, Nozzles, Aerodynamics, Supersonics, Acoustics, Tests.

An experimental investigation was conducted in order to determine the effect of changes in the geometry of multijet nozzles on noise generation. Jet-pressure ratios of 1.67 and 2.33 were investigated for three-, five-, and seven-nozzle configurations with nozzle widths of 0.5, 0.75, 1.0, and 1.25 inches and spacings of 0.5, 1.0, and 1.5 inches. Test results showed that minimum power ratios were obtained at spacing ratios of 2.0 and 1.5 at subsonic and supersonic pressure ratios, respectively. Full-scale test results are in good agreement with the established curves. Significant reductions in the intensity of power-spectrum levels at the low- and mid-frequency portions of the spectral distribution curve accompany a change in geometrical configuration of multiple nozzles to one with a minimum power ratio. (Author)

AD-262 452 Div. 9
(5 Sep 61) OTS price $4.60

Polytechnic Inst. of Brooklyn, N. Y.
PRACTICAL ASPECTS OF REENTRY PROBLEMS,
by Antonio Ferri and Lu Ting. July 61, 39p. incl. illus. 11 refs. (PIBAL rept. no. 705)
(Contract AF 49(638)445, Proj. 9781)
(AFOSR-1178) Unclassified report

DESCRIPTORS: *Re-entry aerodynamics, *Satellite vehicle trajectories, Deceleration, Re-entry vehicles, Lift, Landing, Hypervelocity vehicles, Velocity, Maneuverability.

Entry trajectories for vehicles without and with lift are investigated. The existence and the significance of the second peak deceleration in reentry trajectories are presented. The second peak may be greater than the first one. For a given entry velocity, the first peak deceleration can be a discontinuous function of entry angle. With proper lift modulation of the body-type vehicle, i.e. by changing the angle of attack of the vehicle, the range of the entry angle for non-skip trajectories can be increased significantly, while the first peak deceleration remains less than 5 times the gravitational acceleration. A constant elevation maneuver is presented and its effectiveness in reducing the second peak deceleration is explained. This maneuver, followed by a constant lift modulation, permits the control of the point of landing over a wide range. The practical application of the rate of change of deceleration in deciding the proper lift modulation is demonstrated. (Author)

AD-262 495 Div. 9, 31
(6 Sep 61) OTS price $5.60

Davidson Lab., Stevens Inst. of Tech., Hoboken, N. J.
ANALYSIS OF SHIP FORMS TO MINIMIZE WAVEMAKING RESISTANCE,
by Milton Martin and James White. May 61, 59p. incl. illus. table, 22 refs. (Rept. no. 845)
(Contract Nonr-26331)
Unclassified report

DESCRIPTORS: *Ships, Ship models, Design, Configuration, Destroyers, Model tests, Analysis, Water waves, Resistance, Reduction, Fluid flow, Hydrodynamics, *Measurement, Determination, Mathematical analysis, Boundary layer, Tables, Integral equations.

Weinblum's tables were used to compute the lines of a ship with the over-all dimensions of a high-speed destroyer and a minimum wavemaking resistance at a Froude number of 0.5. The wavemaking resistance of a model of this ship was measured at 3 different drafts over a Froude number range of 0.07 to 0.65. A second series of measurements was made after the model was modified to compensate for the effects of the boundary layer displacement thickness. The results of these tests were compared with those of equivalent Taylor Series models, a destroyer, and with thin-ship computations. The results indicate the possibility of obtaining about 10% reduction in

over-all resistance over the Taylor Series model and about 8% over the destroyer at high Froude numbers, at the expense of poorer performance at low Froude numbers. The resistance of other forms optimized in the same way for Froude numbers in the range between 0.20 and 1.0 and with prismatic coefficients in the range between 0.56 and 0.74 also were computed. (Author)

AD-262 552 Div. 9, 1
(6 Sep 61) OTS price $4.60

Mississippi State U., State College.
AN INVESTIGATION OF THE EFFECTS OF INDUCED NONSYMMETRIC PRESSURE DISTRIBUTIONS ON THE AERODYNAMIC STABILITY OF AN AIRSHIP FORM,
by Donald W. Boatwright. 11 Aug 61, 18p. illus. (Research rept. no. 36)
(Contract Nonr-97802)

Unclassified report

DESCRIPTORS: *Airships, Flight testing, *Control systems, Pressure, Moments, Drag, Stability, *Aerodynamics, *Subsonic flow, *Spoilers.

Installations which would induce nonsymmetric pressure distributions about the airship hull or create high off-center drag forces were suggested for evaluation as possible control devices for the finless airship. Inflatable, compartmented rings or bulges, and extensible spoilers are examples of the type of devices considered worthy of investigation. The results of a study of the effects of induced nonsymmetric pressure distributions on the aerodynamic stability of an airship model are presented as a first step toward the evaluation of such control devices. Flight test measurements of the pressure distributions of a ZS2G-1 model were integrated to obtain force and moment parameters acting on the model and were compared to conventional airship data. An analysis of the results using geometric devices and air ejection for inducing nonsymmetric pressure distributions are presented. (Author)

AD-262 620 Div. 9, 25
(8 Sep 61) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
ON TWO FEATURES OF CAVITATIONAL QUALITIES OF A CENTRIFUGAL PUMP WITH FEATHER TYPE VANE AND PARTIAL DISCHARGE OF LIQUID (O Dvukh Osobennostyakh Kavitatsionnykh Kharakteristik Tsentrobezhnogo Nasosa S Kryl'chatkoy Peryevogo Tipa I Partsial'nym Otvodom Zhidkosti),
by V. I. Dumov and M. A. Peshkin. 29 June 61, 9p. incl. illus. (Trans. no. MCL-1158 of Izvestiya Vysshikh Uchebnykh Zevedeniy, Ministerstvo Vysshego Obrazovaniya SSSR, Seriya Aviatsionnaya Tekhnika 2:147-150, 1959)

Unclassified report

DESCRIPTORS: *Centrifugal pumps, *Cavitation, Hydraulic systems, Kerosene, USSR.

AD-262 632 Div. 9, 12
(8 Sep 61) OTS price $1.60

Allied Research Associates, Inc., Boston, Mass.
LAUNCHING OF AIRBORNE MISSILES UNDERWATER. PART XI - EFFECT OF NONLINEAR SUBMARINE ROLL DAMPING ON MISSILE RESPONSE IN CONFUSED SEAS,
by Theodore R. Goodman and Theodore P. Sargent. 1 Sep 61, 14p. incl. illus. (Document no. ARA-964)
(Contract Nonr-234300)

Unclassified report

DESCRIPTORS: *Guided missiles, Underwater to air, *Launching, *Underwater ballistics, *Hydrodynamics, Gyroscopes, Submarines, Roll, Ocean waves, Damping, Harmonic analysis, Mathematical analysis, Statistical analysis, Integrals, Correlation techniques.

In a previous report (AD-261 457), the radom roll response of a hovering submarine to confused directional seas was determined using the method of generalized harmonic analysis. Roll damping was caused by a linear roll stabilizer gyroscope. This analysis is generalized to include linear natural damping. Nonlinear natural damping and nonlinear gyro damping are taken into account also using the method of equivalent linearization. This analysis is then applied to determine initial conditions due to submarine roll which are imposed on a missile launched from the submarine. The subsequent missile response is then obtained. (Author)

AD-262 696 Div. 9, 31
(11 Sep 61) OTS price $2.60

Institute of Engineering Research, U. of Calif., Berkeley.
INSTABILITY OF SHIP MOTIONS IN LONGITUDINAL WAVES RESULTING FROM NONLINEAR COUPLING,
by C. S. Hsu. May 61, 20p. incl. illus. (Series no. 173, Issue no. 1)
(Contract Nonr-22275)

Unclassified report

DESCRIPTORS: *Ships, Stability, Motion, Ocean waves, Water waves, Vibration, Damping, Frequency, Theory, Mathematical analysis, Roll, Pitch, *Hydrodynamics, Stability (Lateral), Stability (Longitudinal).

An investigation was made of the effect of certain nonlinear coupling terms on the heave-pitch-roll motions of a ship moving in longitudinal waves (either head or following waves). Linear damping terms were retained in the analysis because when forced ship motions under wave excitation are studied, the damping terms are essential elements of the problem. The analysis for the heave-pitch-roll system showed the existence of a type of instability such that the responses in pitch or roll may grow without bound even when the effect of damping was taken into account because of nonlinear coupling between heave and pitch and between heave and roll. This is in contrast to the results obtained from the linear theory in which, because of the presence of damping, all the responses are finite. (Author)

AD-262 705 Div. 9
(11 Sep 61) OTS price $4.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
IONIZATION AND RADIATION IN RE-ENTRY FLOW FIELDS, A SELECTIVE BIBLIOGRAPHY,

comp. by George E. Owens. June 61, 43p.
(Special bibliography no. SB-61-34; Rept. no. 3-80-61-5)
(Contract NOrd-17017)
Unclassified report

DESCRIPTORS: *Bibliography, Re-entry aerodynamics, *Ionization, Electromagnetic waves, *Hypersonics, Communication systems, Detection, Hypersonic flow.

This bibliography is concerned with the interaction between the ionized flow field surrounding hypersonic objects and the electromagnetic radiations which are used to detect, observe, or communicate with the objects. (Author)

AD-262 712 Div. 9, 12
(11 Sep 61) OTS price $4.60

Naval Ordnance Lab., White Oak, Md.
AN INVESTIGATION OF THE ROLLING MOTION OF CRUCIFORM-FIN CONFIGURATIONS,
by John E. Greene. July 61, 50p. incl. illus. table (Aerodynamics research rept. no. 51)
(NAVORD rept. no. 6262)
Unclassified report

DESCRIPTORS: *Fins, *Cruciform wings, Roll, Aerodynamic configurations, *Guided missiles, *Rockets, *Aerodynamics, Experimental data, Moments, *Subsonic flow, Photographic analysis, Yaw, Bodies of revolution.

An experimental investigation was made of the rolling motion of a cruciform fin-alone and body-fin configuration at angles of attack through 90 degrees. It was found that large variations in the steady-state rolling velocity occur with change in angle of attack. The mechanism causing these variations is discussed using results obtained from roll velocity measurements and smoke picture techniques. (Author)

AD-262 734 Div. 9
(11 Sep 61) OTS price $3.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
SOME REYNOLDS NUMBER EFFECTS ON THE PERFORMANCE OF EJECTORS WITHOUT INDUCED FLOW,
by R. C. Bauer and R. C. German. Aug 61, 38p. incl. illus. tables (Rept. no. AEDC TN 61-87)
(Contract AF 40(600)800)
Unclassified report

DESCRIPTORS: *Air ejectors, Tests, *Aerodynamics, *Reynolds number, Nozzles, Pressure, Diffusers, Subsonic flow.

The variation of minimum cell pressure ratio with nozzle total pressure level is presented for various ejector configurations having axially symmetric nozzles located on the centerline of cylindrical ducts. Seven nozzles were tested, using unheated air, in combination with two cylindrical ducts of different diameter and of length to diameter ratio equal to or greater than five. The significant parameter involving nozzle total pressure level was found to be the unit Reynolds number at the nozzle exit times the nozzle throat diameter. An empirical method, which is usually accurate to within 20 percent of the experimental values, was developed for predicting the variation of minimum cell pressure ratio with nozzle total pressure level for ejectors using 18-deg conical nozzles. Curves are presented which permit the estimation of minimum cell pressure ratio for ejectors using isentropic or other contoured nozzles similar to those used in this investigation. A similarity parameter is presented which denotes the necessary condition for the equal performance of two geometrically similar ejector systems using different driving fluids. (Author)

AD-262 739 Div. 9
(11 Sep 61) OTS price $2.60

Iowa Inst. of Hydraulic Research, Iowa City.
TESTS OF A CAVITATING HYDROFOIL.
Final rept.
July 61, 26p. incl. illus.
(Contract N9onr-93805)
Unclassified report

DESCRIPTORS: *Hydrofoils, *Cavitation, Determination, Water tunnels, Test equipment, Test facilities, Test methods, Measurement, Drag, Lift, Moments, Dynamometers, Fluid flow, Tests.

A dynamometer capable of measuring the force and moment characteristics of a hydrofoil in cavitating flow was developed. The system is convenient for measuring lift and moment, but troublesome for measuring drag because of the sensitivity of the drag calibration to the ambient pressure in the water tunnel. There is a large discrepancy between cavitation numbers based upon vapor and cavity pressures and it is important that the latter be used in order to obtain correct results. A serious difficulty in interpreting the results of tests on cavitating hydrofoils in a water tunnel so as to apply to a hydrofoil in a fred stream is the effect of the tunnel walls on the cavitating flow. Attempts were made to correct approximately for this effect by using cavitation numbers based on pressures at the downstream end of the test section rather than at its upstream end. (Author)

AD-262 794 Div. 9
(12 Sep 61) OTS price $3.60

Mississippi State U., State College.
THE THREE-DIMENSIONAL TURBULENT BOUNDARY LAYER ON A ROTATING DISK,
by William Charles Stain. 8 Aug 61, 37p. incl. illus. tables (Research rept. no. 35)
(Contract Nonr-97801)
Unclassified report

DESCRIPTORS: *Bodies of revolution, *Disks, *Turbines, *Aerial propellers, Aerodynamics, Boundary layer, *Turbulent boundary layer, Theory, Tests, Rotating structures.

The 3-dimensional turbulent boundary layer produced by a disk rotating in still air was studied theoretically and experimentally. Some of the laws governing 2-dimensional turbulent boundary layers were examined in comparison with 3-dimensional turbulent profiles of a rotating disk. It was shown that a universal description of 2-dimensional turbulent boundary layers by Cornish can be extended to very accurately describe the tangential component of a rotating disk boundary layer. It was shown that a new wake function is required to accurately describe the radial component of the 3-dimensional boundary layer. This function, the cross-flow wake function, was developed and combined with Cornish's wall function to give a description of the radial velocity profile. (Author)

AD-262 842 Div. 9
(13 Sep 61) OTS price $2.00

Sandia Corp., Albuquerque, N. Mex.
MACH TABLES FOR REAL GAS EQUILIBRIUM FLOW OF AIR IN HYPERVELOCITY TEST FACILITIES WITH TOTAL TEMPERATURES TO 10,000 DEGREE K,
by K. L. Goin. Mar 61, 81p. incl. illus. tables. (Rept. no. SCR-288; Rept. no. TID-4500, 16th ed.)
Unclassified report

DESCRIPTORS: *Mach numbers, *Tables, Gas flow, *Hypersonic flow, Hypersonic wind tunnels, Aerodynamic heating, *Temperature, Tests.

Aerodynamic flow parameters for isentropic expansions and flow through normal shocks, including real gas effects, have been calculated for total temperatures of 4000 to 10,000 K and for total pressures of 100 to 4000 atmospheres. Calculations assume equilibrium flow. Results indicate real gas effects vary from a few percent to more than two orders of magnitude. (Author)

AD-262 843 Div. 9, 1, 30
(13 Sep 61) OTS price $5.60

AVCO Research Lab., Everett, Mass.
PHYSICAL GAS DYNAMIC RESEARCH AT THE AVCO RESEARCH LABORATORY,
by P. H. Rose. May 57, 53p. incl. illus. tables, 32 refs. (Research rept. no. 9, formerly Research note no. 37)
(Contract AF 04(645)18)
Unclassified report

Presented at the 7th Meeting of the AGARD Wind Tunnel and Model Testing Panel in July, 1957 at Scheveningen, Netherlands.

DESCRIPTORS: *Wind tunnel models, Hypersonic test vehicles, *Shock tubes, Hypersonic wind tunnels, *High temperature research, Hypersonic flow, *Magnetohydrodynamics, Hypersonics, Gas flow, Heat transfer, Measurement.

The advantages of the straight shock tube for investigation of high temperature gas dynamics are discussed. The enthalpy and pressure attainable at the stagnation point of a blunt model in a shock tube are given and are shown to duplicate those encountered at the stagnation point in flight up to the satellite velocity. In addition the condition in the hot gas behind both the moving shock wave and behind a shock wave reflected from the closed end of the tube are shown to be applicable to the study of many hypersonic flight phenomena. Several investigations, conducted in shock tubes, into critical gas dynamic problems associated with the high temperature are described. Heat transfer measurement in the laminar, dissociated, boundary layer at the stagnation point are discussed. Measurements of the radiative emissivity and electrical conductivity of high temperature air are described. Other investigations into the properties of high temperature gases, including preliminary studies of magnetohydrodynamics are summarized. (Author)

AD-262 876 Div. 9, 12
(13 Sep 61) OTS price $2.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
DYNAMIC STABILITY MEASUREMENTS,
by T. L. Smith. June 61, 30p. (BRL memo. rept. no. 1352)
(Proj. 503-03-009)
Unclassified report

DESCRIPTORS: *Stability, Measurement, *Aerodynamics, Damping, Supersonics, Wind tunnel models, Vibration, Supersonic wind tunnels, *Exterior ballistics, *Guided missiles, Test methods, Errors, Supersonic flight, Tests, Mathematical analysis, Model tests.

The dynamic and static stability of a non-spinning missile in a wind tunnel is considered. It is assumed that the method used is to mount the model so that it is free to oscillate, and to observe the time rate of decay of oscillations with and without the wind on. Some of the sources of error are discussed. It is assumed that the test is to study the dynamic stability of a non-spinning missile when flying at supersonic speeds. The time history of decaying oscillations is recorded both with wind on, and with wind off (generally with the tunnel evacuated). From these observations, it is hoped that the aerodynamic damping which would occur in free flight can be estimated. (Author)

AD-262 915 Div. 9
(14 Sep 61) OTS price $5.60

Hydronautics, Inc., Rockville, Md.
THE LINEARIZED THEORY OF A SUPERCAVITATING HYDROFOIL WITH A JET FLAP,
by Hung-Ta Ho. June 61, 57p. incl. illus. tables (Technical rept. no. 119-2)
(Contract NObs-84296)
Unclassified report

DESCRIPTORS: *Hydrofoils, *Jet mixing flow, *Cavitation, *Theory, Mathematics, Vortices, Integrals, Fourier analysis.

A theoretical analysis is carried out for the steady cavity flow about thin hydrofoil sections at small incidence alpha, at the trailing edge of which a thin jet emerges at a small deflection pi. The flow is assumed to be inviscid and incompressible and the cavitation number is taken to be zero. The jet is assumed so thin that it can be considered as a vortex sheet across which the velocity is discontinuous. For the case of a flat plate, expressions have been obtained for lift, drag, pressure distribution, pitching moment, the jet shape and the cavity shape. Numerical calculations are made for a number of jet momentum-flux coefficients C sub J lying between 0.01 and 5. (Author)

AD-262 930 Div. 9, 25
(13 Sep 61) OTS price $.50

National Aeronautics and Space Administration, Washington, D. C.
HEAT TRANSFER AT THE REATTACHMENT ZONE OF SEPARATED LAMINAR BOUNDARY LAYERS,
by Paul M. Chung and John R. Viegas. Sep 61, 17p. incl. illus. tables (NASA Technical note no. D-1072)
Unclassified report

Also available from NASA, Wash. 25, D. C. as NASA TN D-1072.

DESCRIPTORS: *Laminar boundary layer, Separation, *Blunt bodies, *Hypersonic test vehicles, Fluid flow, Hypersonics, Hypersonic flow, Analysis, Pressure, Integration, Partial differential equations, *Heat transfer, Enthalpy, Vortices, Reynolds number.

The flow and heat transfer are analyzed at the reattachment zone of two-dimensional separated laminar boundary layers. The fluid is considered to be flowing normal to the wall at reattachment. An approximate expression is derived for the heat transfer in the reattachment region and a calculated value is compared with an experimental measurement. (Author)

AD-262 951 Div. 9, 30
(14 Sep 61) OTS price $2.60

Taggart, Robert, Inc., Falls Church, Va.
AN EXPERIMENTAL STUDY OF ACOUSTIC EXCITATION OF FLAT PLATES BY UNSTEADY FLOW,
by Matthew Stevenson, David W. Saltus, and Robert Taggart. 20 July 61, 29p. incl. illus.
(Rept. no. RT-1101)
(Contract Nonr-303000)
Unclassified report

DESCRIPTORS: *Fluid flow, Oscillation, Turbulent boundary layer, *Sheets, Vibration, Air, Pressure, *Acoustics, Excitation, *Wind tunnels, Turbulence, *Model basins, Measurement, Velocity, Manamometer, Hydrophones, Recording device, Accelerometers, Heaters, Instrumentation, Shear stresses.

Tests were conducted in a gravity flow tunnel with a thin, flexible plate installed in one wall. Measurements were made of flow velocities and boundary layer characteristics in the tunnel and correlated with acoustic measurements of the test plate vibrations. It is demonstrated that unsteady flow excitation at the boundary causes vibration of the plate at many natural modes. Data on vibration amplitudes are related to the excitation of pressure fluctuations in the boundary layer. (Author)

AD-262 996 Div. 9, 15
(15 Sep 61) OTS price $3.60

Brown U. Div. of Applied Mathematics, Providence, R. I.
ON THE STABILITY OF VISCOUS FLOW BETWEEN ROTATING CYLINDERS. I. ASYMPTOTIC ANALYSIS,
by R. L. Duty and W. H. Reid. July 61, 29p. incl. illus. (Technical rept. no. 42)
(Contract Nonr-56207, Proj. NR-062-179)
Unclassified report

DESCRIPTORS: *Cylindrical bodies, *Rotating structures, *Fluid flow, Stability, Theory, *Mathematical analysis, Differential equations, Equations, Integrals, Integral transforms, Taylor series, Series, Functions.

The stability of Couette flow is discussed in the case in which the cylinders rotate in opposite directions by an asymptotic method in which the Taylor number is treated as a large parameter. On assuming the principle of exchange of stabilities to hold, the problem is then governed by a sixth-order differential equation with a simple turning point. It is then shown how the solutions of this equation can be represented asymptotically in terms of the solutions of a basic reference equation. The solutions of this basic reference equation have recently been tabulated; this is an explicit representation of the solution of the stability problem in terms of tabulated functions. Detailed results for the critical Taylor number and wave-number at the onset of instability and the associated eigenfunctions are given for a limiting case. In this case there exists an infinite number of cells between the cylinders but that the amplitude of the secondary motion in all but the innermost cell is small. (Author)

AD-262 997 Div. 9, 15
(15 Sep 61) OTS price $1.60

Brown U. Div. of Applied Mathematics, Providence, R. I.
ONE-DIMENSIONAL EQUILIBRIUM SPECTRA IN ISOTROPIC TURBULENCE. II,
by C. Chandler and W. H. Reid. May 61, 17p. incl. illus. tables (Technical rept. no. 46)
(Contract Nonr-56207, Proj. NR-062-179)
Unclassified report

DESCRIPTORS: *Turbulence, Theory, Atmosphere models, Viscosity, Spectrographic analysis, Mathematical analysis, *Integral transforms, Functions, *Fluid mechanics, Transport properties.

It is shown that when a cut-off is imposed on Heisenberg's equilibrium spectrum the cut-off wave number cannot be assigned arbitrarily but must have the value $k_\eta = 3K_H^2\epsilon/8\nu^3)^{1/4}$. The energy spectrum is then of the form $E(k) = (8\epsilon/9K_H)^{2/3}k^{-5/3}$ for $0 < k < k'$ and zero otherwise. The velocity and pressure correlations corresponding to this spectrum are then obtained. From these results it is then possible to determine the ratio of the mean-square pressure gradient to the mean-square viscous force. For $K_H = 0.45$, this ratio is found to have a value of about 30. (Author)

AD-263 016 Div. 9, 12
(18 Sep 61) OTS price $15.50

Institute for System Research, U. of Chicago, Ill.
DETERMINING AIR REACTIONS ON MOVING VEHICLES. PART V. METHODS OF AERODYNAMICS-COMPOSITE BODIES,
by M. Z. Krzywoblocki. Aug 60, 230p. incl. illus. tables, 901 refs.
(Contract AF 33(616)5689, Proj. 7060)
(WADC TR 56-51, pt. 5) Unclassified report

DESCRIPTORS: *Aerodynamics, *Fluid flow, Bodies of revolution, *Satellite vehicles, Bibliography, *Mathematical analysis, *Astronautics, *Ailerons, *Control surfaces, *Airfoils, *Flutter, *Tails.

The volume contains information concerning the following items: aerodynamics of composite bodies, effects of control flaps and ailerons, and nonsteady aerodynamics of composite elements including aerodynamics, flutter, buffeting, and tail surfaces. (Author)

AD-263 074 Div. 9
(18 Sep 61) OTS price $2.25

National Aeronautics and Space Administration, Washington, D. C.
APPROXIMATE TEMPERATURE DISTRIBUTIONS AND STREAMWISE HEAT CONDUCTION EFFECTS IN THE TRANSIENT AERODYNAMIC HEATING OF THIN-SKINNED BODIES,
by Raul J. Conti. Sep 61, 90p. incl. illus.
(NASA Technical note no. D-895)
Unclassified report

Also available from NASA, Wash. 25, D. C. as NASA Technical note no. D-895.

DESCRIPTORS: *Aerodynamic heating, *Aerodynamic configurations, *Heat transfer, Thickness, Mathematical analysis, Thermal conductivity, *Hypersonics, Conical bodies, Hemispherical shells, Wedges, Laminar boundary layer, Turbulent boundary layer, *Heat transfer.

An approximate method is devised to determine temperature distributions during the transient aerodynamic heating of thin-skinned, heat-conducting bodies. This permits evaluation of the streamwise conduction errors arising in the measurement of heat-transfer coefficients based on the skin-temperature history. The present method is valid for a large range of body shapes and thickness distributions, within the limitations of one-dimensional (streamwise) heat conduction, quasi-isothermal surface, constant adiabatic wall temperature, and negligible radiative heat transfer. Numerical computations were carried out for flat plates, wedges, and conical, hemispherical, and hemicylindrical shells. The results are presented in the form of nondimensional charts that permit a rapid evaluation of a 10-percent error threshold in transient heat-transfer measurements. (Author)

AD-263 079 Div. 9, 12
(18 Sep 61) OTS price $.75

National Aeronautics and Space Administration, Washington, D. C.
A METHOD FOR LONGITUDINAL AND LATERAL RANGE CONTROL FOR A HIGH-DRAG LOW-LIFT VEHICLE ENTERING THE ATMOSPHERE OF A ROTATING EARTH,
by John W. Young. Sep 61, 26p. incl. illus.
(NASA Technical note no. D-954)
Unclassified report

Also available from NASA, Wash. 25, D. C. as NASA Technical note no. D-954.

DESCRIPTORS: *Hypervelocity vehicles, Atmosphere entry, *Re-entry aerodynamics, Lift, Drag, Flight paths, Satellite vehicle trajectories, *Satellite vehicles.

A study has been made of a method for controlling the trajectory of a high-drag, low-lift entry vehicle to a desired longitude and latitude on the surface of a rotating earth. By use of this control technique the vehicle can be guided to the desired point when the present position and heading of the vehicle are known and the desired longitude and latitude are specified. The present study makes use of a single reference trajectory and an estimate of the lift and side-force capabilities of the vehicle. This information is stored in a control-logic system and used with linear control equations to guide the vehicle to the desired destination. Results are presented of a number of trajectory studies which describe the operation of the control system and illustrate its ability to control the vehicle trajectory to the desired landing area. (Author)

AD-263 081 Div. 9, 12, 25
(18 Sep 61) OTS price $.75

National Aeronautics and Space Administration, Washington, D. C.
RADIATION EMISSION EFFECTS OF THE EQUILIBRIUM BOUNDARY LAYER IN THE STAGNATION REGION,
by John Thomas Howe. Sep 61, 30p. incl. illus.
(NASA Technical note no. D-1031)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note no. D-1031.

DESCRIPTORS: *Boundary layer, Separation, Heat transfer, Shock waves, Thickness, Laminar boundary layer, Compressible flow, *Thermal radiation, Blunt bodies, Superaerodynamics, Mathematical analysis, Hypervelocity vehicles, Hypersonics.

The laminar compressible boundary layer in chemical equilibrium is analyzed to show the effect of emission of radiation by the boundary layer on solutions of the energy equation and on the resulting heat transfer. Solutions are obtained at one flight condition, but for several nose radii, in a regime where absorption is negligible. The consequent effects on heat transfer and boundary-layer thickness are determined. The concept of a separate boundary layer and shock layer is discussed in the light of the results obtained. (Author)

AD-263 083 Div. 9
(18 Sep 61) OTS price $1.50

National Aeronautics and Space Administration, Washington, D. C.
THE LAMINAR BOUNDARY LAYER AT HYPERSONIC SPEEDS,
by Carlo Ferrari. Sep 61, 56p. incl. illus. tables (NASA Technical translation no. F-71 of Sullo Strato Limite Laminare in Corrente Ipersonica L'Aerotecnica 36:pp. 68-94, Apr 56)
Unclassified report

Also available from NASA, Wash. 25, D. C. as NASA Technical translation no. F-71.

DESCRIPTORS: *Laminar boundary layer, *Hypersonic flow, *Airfoils, Heat transfer, Pressure, Deflection, Gas flow, Mathematical analysis, Partial differential equations, Integral equations, *Hypersonics.

A theoretical inquiry is made into the nature of the laminar boundary layer on an airfoil immersed in a hypersonic stream under the assumptions that: (a) there is no heat transfer to the wall and the Prandtl number is unity and (b) there is a zero gradient of pressure normal to the direction of development of the layer along the wall. In the derivations, the treatment will be strictly applicable only at a sufficient distance downstream from the leading edge. On the basis of the results deduced from such an analysis, it becomes clear that the influence of the pressure gradient, created by the presence of the thick boundary layer, is appreciable even when the hypersonic similarity parameter is as low as 0.12. (Author)

10. FUELS AND COMBUSTION

AD-262 335 Div. 10
(1 Sep 61) OTS price $3.60

Princeton U., N. J.
NONLINEAR ASPECTS OF COMBUSTION INSTABILITY IN LIQUID PROPELLANT ROCKET MOTORS.
Yearly progress rept. no. 1, 15 June 60-31 May 61,
by David T. Harrje. 1 June 61, 36p. incl. illus.
(NASA Grant NsG-99-60)
Unclassified report

Division 10 - FUELS AND COMBUSTION

DESCRIPTORS: *Rocket motors, *Liquid rocket propellants, *Combustion, Stability, Shock waves, Detonation waves, Fuel injection, Photographic equipment, Cameras, Schlieren photography, Test equipment, Model tests, Test methods, Combustion chambers, Simulation, Theory, Sensitivity, Nonlinear systems.

An optical model of a no-flow rocket motor was completely designed: (1) to establish the characteristics of the incoming perturbation - in the current system a perturbation produced by a pulse generator utilizing blank cartridges and precision diaphragms, (2) to aid in evaluating the velocity probe prior to its insertion into a hot rocket motor, and (3) to observe, for the applied perturbation, the shock wave patterns produced and the time for decay under varying rocket motor conditions. Nonlinear rocket tests so far have consisted of rechecking one chamber-injector combination to determine the stability limits prior to the introduction of nonlinear perturbations. A solution to the theoretical model based on strong shock waves rotating in the chamber is being attempted using IBM 650 equipment. (Author)

AD-262 338 Div. 10, 30
(1 Sep 61) OTS price $9.60

Phillips Petroleum Co., Bartlesville, Okla.
THERMAL STABILITY OF HYDROCARBON FUELS.
Rept. for 1 May 60-30 Apr 61, on Aviation Fuels, by G. D. Kittredge, W. L. Streets, and Rex Ratchford. July 61, 119p. incl. illus. tables, 20 refs.
(Contract AF 33(616)7241, Proj. 3048)
(ASD TR 61-238) Unclassified report

DESCRIPTORS: Hydrocarbons, *Fuels, Stability, Temperature, *Jet engine fuels, Test equipment, Design, Storage, Thermal insulation, Deposits, Tests methods, Light transmission, Antioxidants, Effectiveness, Fuel additives, Aviation fuels.

Research was conducted to: (1) develop a small scale jet fuel thermal stability tester capable of operation at fuel temperatures from 300 to 650 F with samples 1 qt or less in size, and (2) study the effects of storage on thermal stability performance of JP-6 grade jet fuels and establish causes (in terms of environmental factors and fuel composition) for any adverse results observed. Three potentially useful techniques were produced: (1) a recirculating-flow dynamic method measuring deposit insulating effects around a heated surface which requires 1000 ml fuel samples, (2) a static method measuring deposit insulating effects around a heated nickel wire which requires 150 ml fuel samples, and (=0 a static method based on changes in fuel light transmission characteristics after heating which requires only 5-ml fuel samples. The JP-6 storage stability invesigation (1 yr) showed that 3 out of 5 test fuels did deteriorate significantly after 26 wk at 110 F in terms of CFR Fuel Coker rating, while a fourth fuel showed evidence of deterioration in one container only which is attributed to solids contamination. (Author)

AD-262 356 Div. 10, 25
(30 Aug 61) OTS price $2.60

Southwest Research Inst., San Antonio, Tex.
THE EFFECT OF REACTANT CONSUMPTION IN NONSTEADY EXPLOSION THEORY,
by William Squire. Aug 61, 24p. (Technical rept. no. 1)
(Contract NAopr-2660)
Unclassified report

DESCRIPTORS: *Combustion, *Explosions, Ignition, *Heat transfer, *Thermodynamics, Theory, Solids, Wood, Mathematical analysis, Differential equations, Numerical methods and procedures.

The effect of reactant consumption in nonsteady explosion theory is investigated by an exact numerical method and an approximate analytical treatment. Results are presented for the critical conditions and the ignition delay for supercritical conditions. The approximate analysis gives ignition delays in good agreement with the numerical solution, but the critical conditions are not obtained as accurately as in an alternative analysis due to Thomas. A comparison of temperature-time histories computed by the exact numerical method with experiments reported by Akita showed satisfactory agreement and indicated that reactant consumption was significant for wood. (Author)

AD-262 367 Div. 10, 25
(1 Sep 61) OTS price $3.60

Reaction Motors Div., Thiokol Chemical Corp., Denville, N. J.
THE ELECTRICAL PROPERTIES OF IONIZED FLAMES. PART I. STUDY OF FLAME IONIZATION,
by Thomas H. Dimmock and W. R. Kineyko. Aug 61, 34p. incl. illus. tables.
(Contract AF 49(638)305, Proj. 9752)
(AFOSR-825) Unclassified report

DESCRIPTORS: *Flames, Rocket propellants, Ionization, Electrical properties, Temperature, Density, Optics, Hydrogen, Oxygen, Oxides, Oxidizers, Nitrogen compounds, Test equipment, Test methods, Spectrographic analysis, Microwave spectroscopy, *Plasma physics, *Gas ionization, Ethylene oxide, Measurement, Additives, Combustion chamber gases, *Combustion, Exhaust gases, Exhaust flames, Determination, Ions.

The concentration and distribution of the ions in high-temperature flames enriched with easily ionized additives was determined. Ionization densities up to 10 to the 14th power/cc were measured by Langmuir probes. Other methods of measuring flame ionization, such as double probes and microwave attenuation were employed and corroborated single probe measurements. For these tests, hydrogen flames were burned with both oxygen and nitric oxide. Measurements of ionization in the H2/02 flames reached 10 to the 14th power/cc and agreed with theoretical values. Measurements in the H2/NO flame never surpassed 10 to the 13th power/cc and were found to depend critically upon propellant flow rate and burner geometry. A large cold gas boundary layer which exists in the nitric oxide flames forms a thermal barrier to the passage of electrons from the burner into the flame and influences probe measurements. (Author)

AD-262 368 Div. 10, 25
(1 Sep 61) OTS price $3.60

Reaction Motors Div., Thiokol Chemical Corp., Denville, N. J.
THE ELECTRICAL PROPERTIES OF IONIZED FLAMES. PART II. ELECTROSTATIC AND MAGNETOHYDRODYNAMIC DEFLECTION,
by T. H. Dimmock, G. G. Miller and others. Aug 61, 34p. incl. illus. tables.
(Contract AF 49(638)305, Proj. 9752)
(AFOSR-990) Unclassified report

DESCRIPTORS: *Flames, *Ionization, *Magnetohydrodynamics, Gas ionization, Electrical properties, Temperature, Electric fields, Magnetic fields, Deflection, Additives, Plasma physics, Test equipment, Test methods, Ions, Density, Electromagnetic effects, Magnetic effects, Combustion chamber gases, *Combustion, Exhaust gases, Exhaust flames, Hydrogen, Oxygen, Nitrogen compounds, Oxides, Rocket propellants, *Electrostatics.

The electrical properties of highly ionized, high temperature flames have been investigated to determine the interaction of the flame with electric and/or magnetic fields. With electric fields alone, no deflection is obtained because the field intensity within the flame is too small whether the field electrodes are outside or inside of the flame. Most of the potential drop between the electrodes occurs at the boundary layer on the electrodes. (With the unseeded flame, however, electrostatic deflection up to 45 degrees was readily obtained.) A combination of transverse electric and longitudinal magnetic fields produced a Lorentz force on the flame of 10 newtons/cu m; this force deflected a highly ionized flame up to 45 degrees. The deflection is proportional to the Lorentz force and inversely proportional to the inertial force. The magnitude of the flame conductivity (i.e., ionization) determines the power supply requirements for the electric field; the power required for the electric field decreases with increasing flame conductivity. (Author)

AD-262 668 Div. 10, 27
(8 Sep 61) OTS price $4.60

New York U. Coll. of Engineering, N. Y.
MACROSONIC COMBUSTION.
Final rept. on Phase 1, High Amplitude Oscillations in Solid Fuel Rocket Motors (Literature and Theoretical Analysis),
by Moshe Richman, 1961, 43p. incl. illus. 33 refs.
(Subcontract to Cleveland Pneumatic Industries, Inc., Bethesda, Md., Contract Nonr-315500)
Unclassified report

DESCRIPTORS: *Solid rocket propellants, *Combustion, Oscillation, *Jet acoustic oscillations, Theory, *Rocket motors, Combustion chambers, Configuration, Cylindrical bodies.

Contents:
Burning
Combustion zone
Heat transfer
Types of propellants
Solid propellant chamber
Common configurations
Oscillatory modes in a cylindrical cavity
Oscillatory burning and irregular burning
Oscillatory burning
Irregular burning
Stabilization techniques
Mechanism of self-excitation
Experimental observations
Erosive burning
Theories advanced in an attempt to explain steady and irregular burning

AD-262 770 Div. 10
(21 Sep 61) OTS price $1.60

Princeton U., N. J.
BURNING RATE CONTROL FACTORS IN SOLID PROPELLANTS.
Quarterly technical summary rept. no. 10,
1 Apr-30 June 61,
by Kimball P. Hall and E. Karl Bastress. 1 Aug 61, 11p. (Aeronautical engineering rept. no. 446-j)
(Contract Nonr-185832, Proj. NR 098-201)
(ARPA Order nos. 23-59 and 23-60)
Unclassified report

DESCRIPTORS: *Solid rocket propellants, *Combustion, Particles, Ammonium radicals, Perchlorates, Polymers, Sulfides, Acrylic resins, Butadienes, Aluminum, Rocket oxidizers, Binders, Rocket fuels, Pressure, High pressure research.

Propellants were prepared with varying coarse and fine particle sizes (of which 70% was coarse and 30% fine). Burning rates indicated that the size of the fine oxidizer particles in a bimodal distribution does not significantly influence the burning rate. Propellants containing 27.5% polybutadiene acrylic acid binder and 72.5% NH_4ClO_4 in narrow unimodal particle size distributions were tested. Burning rates varied inversely with particle size, more strongly at low than high pressures. Fine particle propellants (9 and 16 microns) extinguished above 400 psi; somewhat larger particles (27 and 44 microns) tended toward plateau burning at 400 and 1000 psi. Studies with a 10% Al, 65% NH_4ClO_4, 25% PBAA binder propellant revealed that the addition of Al does not change the propellant burning rate significantly, except at low pressures.

AD-262 832 Div. 10, 4
(13 Sep 61) OTS price $1.10

Texaco Experiment Inc., Richmond, Va.
COMBUSTION OF ELEMENTAL BORON.
Quarterly summary rept. Aug-Oct 60,
by Claude P. Talley and Harry P. Woods.
1 Nov 60, 4p. (Rept. no. TM-1270; EXP 223)
(Contract Nonr-188300)
Unclassified report

DESCRIPTORS: *Boron, *Combustion, Temperature, Determination, Gases, Fluorine, Chlorine compounds, Fluorides, High temperature research, Oxidizers, Jet engine fuels, Rods.

Qualitative experiments on the combustion of boron rods in fluorine and chlorine trifluoride gases were performed in a static system. After the rod was ignited, the reactions were self-sustaining at a temperature considerably less than the steady-state combustion temperature for boron in oxygen (approximately 1600 versus 2400 K). The reaction products were not condensable at room temperature. (Author)

AD-262 833 Div. 10, 4
(13 Sep 61) OTS price $1.10

Texaco Experiment Inc., Richmond, Va.
COMBUSTION OF ELEMENTAL BORON.
Quarterly summary rept. Nov 60-Jan 61,
by Claude P. Talley and Harry P. Woods.
1 Feb 61, 4p. (Rept. no. TM-1271; EXP 223)
(Contract Nonr-188300)
Unclassified report

DESCRIPTORS: *Boron, Test equipment, Rods, Measurement, Pressure, Fluorides, Halogen compounds, Oxidizers, *Combustion, High temperature research, Controlled atmospheres, Photographic analysis.

An apparatus was constructed for measuring the change in diameter of boron rods in a stream of halogen fluorides or mixtures of halogen fluorides and inert gases at various flow rates at atmospheric pressure and reduced pressures. (Author)

Division 11 - GROUND TRANSPORTATION EQUIPMENT

AD-262 929 Div. 10, 27
(13 Sep 61) OTS price $.50

National Aeronautics and Space Administration, Washington, D. C.
DETERMINATION OF LOCAL EXPERIMENTAL HEAT-TRANSFER COEFFICIENTS ON COMBUSTION SIDE OF AN AMMONIA-OXYGEN ROCKET,
by Curt H. Liebert and Robert C. Ehlers. Sep 61, 20p. incl. illus. tables (NASA Technical note no. D-1048)
Unclassified report

Also available from NASA, Wash. 25, D. C. as NASA TN D-1048.

DESCRIPTORS: *Rocket motors, *Heat transfer, *Liquid rocket propellants, *Ammonia, *Oxygen, Combustion, Liquefied gases, Analysis, Temperature, Measurement, Rocket motor nozzles, Cooling, Fuel injectors, Combustion chambers, Thrust.

Local experimental heat-transfer coefficients were measured in the chamber and throat of a nominal 600-psia chamber pressure, 2400-lb-thrust ammonia-oxygen rocket engine using three injector configurations. The rocket engine was run over a range of O/F and chamber pressure. The injector that achieved the best performance also produced the highest rates of heat flux at design conditions. The heat-transfer data from this injector agreed well with the simplified equation developed by Bartz at the throat region. A large spread of data observed for the chamber was attributed generally to the variations of combustion processes. The spread was least evident with the best-performing injector. (Author)

AD-262 989 Div. 10
(15 Sep 61) OTS price $9.10

Bureau of Mines, Pittsburgh, Pa.
REVIEW OF FIRE AND EXPLOSION HAZARDS OF FLIGHT VEHICLE COMBUSTIBLES.
Annual rept., Apr 60-Apr 61,
by Robert W. Van Dolah, Michael G. Zabetakis and others. Apr 61, 105p. incl. illus. tables, 29 refs.
(Contract AF 33(616)60-8)
(ASD TR-61-278) Unclassified report

DESCRIPTORS: Fuels, *Aviation fuels, *Rocket propellants, *Rocket oxidizers, Vapor pressure, Combustion, Oxidation, Detonation, Ignition, Theory, Data, Rocket fuels, Liquid rocket propellants, Jet engine fuels, *Hazards, Fires, Aircraft fires, Explosions.

Vapor pressure data are presented for fluorine, oxygen, chlorine trifluoride, nitrogen tetroxide, nitric acid, hydrogen peroxide, ethylene oxide, hydrogen, ammonia, pentaborane, unsymmetrical dimethylhydrazine, monomethylhydrazine, hydrazine and a series of hydrocarbons including decalin, tetralin, bicyclohexyl and other high density fuels. In addition, flammability characteristics diagrams are included for each of these fuels in contact with air and where available, for other oxidants (e.g. oxygen and nitrogen tetroxide). Also included are sections on definitions and theory and applications. Each section is complete in itself and can be used separately. (Author)

11. GROUND TRANSPORTATION EQUIPMENT

AD-262 852 Div. 11
(13 Sep 61) OTS price $7.60

Wilson, Nuttall, Raimond Engineers, Inc., Chestertown, Md.
SCALED VEHICLE MOBILITY FACTORS (SAND).
Interim rept.,
by C. W. Wilson and C. J. Nuttall, Jr. Apr 61, 67p. incl. illus. tables, 13 refs.
(Contract DA 44-177-tc-393)
(TREC TR 61-67) Unclassified report

DESCRIPTORS: *Vehicles, *Tires, Trafficability, Sand, Soils, Snow, Mathematical prediction, Measurement, Tests, Test methods.

This interim report covers tests to determine correlation between scale-model and full-size, 4 x 4, pneumatic-tired vehicles operating in sand. Test results demonstrate that the mobility performance of prototype wheeled vehicles can be accurately predicted by tests on scale-models using the techniques described. Tire selection data for 4 x 4 vehicles are presented covering the full range of sand strengths found in nature, tire loadings from 50 lb. to 50,000 lb., and sizes from 2' to 10' in outside diameter and 0/20 to 1.00 in width/diameter ratio. Means for estimating sand strength for design purposes are also indicated. A simple relationship between tire performance in sands and dry snows is also demonstrated. (Author)

12. GUIDED MISSILES

AD-262 358 Div. 12, 27
(1 Sep 61) OTS price $8.60

Sperry Utah Engineering Lab., Salt Lake City.
MOTOR TEMPERATURE SENSOR, SERGEANT ARTILLERY GUIDED MISSILE SYSTEM.
Summary rept. on TGD 552, TA 1-16 for 1 Mar 60-1 May 61.
10 July 61, 98p. incl illus. tables (SUCO rept. no. EJ-210-0207)
(Contract DA 04-495-ORD-1605) Unclassified report

DESCRIPTORS: *Guided missiles, Surface to surface, Artillery, Solid rocket propellants, *Rocket motors, *Temperature, Measurement, Automatic, Heat transfer, Combustion chambers, *Thermometers.

The temperature-conditioning test results have demonstrated that for any temperature conditions which may occur within Sergeant specifications a sufficiently accurate value for effective temperature can be determined from the cavity and aft-body temperature measurements. The bimetallic sensor has been shown to be accurate, rugged, and compatible with the system. Used in conjunction with the appropriate nomograph, the bimetallic temperature sensor provides a satisfactory means of determining effective temperature, though manual and visual operations are involved. The automatic temperature sensor promises to be equally rugged, more accurate, and will provide effective temperature to the firing set without dependence on manual or visual operations. It is recommended that the bimetallic temperature sensor with its associated nomograph be utilized as an interim method of determining effective motor temperature until the automatic temperature sensor is completely tested and evaluated. Therefore, it is also recommended that the evaluation of the automatic temperature sensor be continued to completion. (Author)

AD-262 383 Div. 12
(1 Sep 61) OTS price $5.60

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
CATALOGUE OF SATELLITE OBSERVATIONS NO. C-22.
Rept. for 1 Sep-31 Dec 60 on Research in Space Science,
by D. V. Mechau. 17 July 61, 52p. (Special rept. no. 66) Unclassified report

DESCRIPTORS: *Satellite vehicle trajectories, Catalogs, Orbital flight paths, Tracking, Corrections.

This analysis lists observations of Satellites 1958 Alpha, 1958 Greek Beta 1, 1959 Greek Alpha 1, 1959 Greek Alpha 2, 1959 Eta, and 1959 Greek Zeta 1 for the period September 1 through December 31, 1960, as well as additions and corrections to previous listings of observations of these satellites and for 1958 Epsilon. The observations include those from the Smithsonian Baker-Nunn camera stations, Moonwatch teams, U. S. and foreign observatories, military installations, Phototrack stations, and miscellaneous observers. (Author)

AD-262 384 Div. 12
(1 Sep 61) OTS price $9.60

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
CATALOGUE OF SATELLITE OBSERVATIONS, NO. C-23.
Rept. for 1 Sep-Dec 60 on Research in Space Science,
by D. V. Mechau. 17 July 61, 112p. (Special rept. no. 67) Unclassified report

DESCRIPTORS: *Satellite vehicle trajectories, Catalogs, Orbital flight paths, Tracking, Corrections.

This analysis lists observations of Satellites 1960 Greek Zeta 1 (ECHO I) and 1960 Greek Zeta 2 (carrier rocket, ECHO I) for the period September 1 through December, 1960. Some observations were rejected because they were grossly in error. The observations include those from the Smithsonian Baker-Nunn camera stations, Moonwatch teams, U. S. and foreign observatories, military installations, Phototrack stations, and miscellaneous observers. (Author)

AD-262 385 Div. 12
(1 Sep 61) OTS price $2.60

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
CATALOGUE OF SATELLITE OBSERVATIONS, NO. C-24.
Rept. on Research in Space Science,
by D. V. Mechau. 17 July 61, 24p. (Special rept. no. 68) Unclassified report

DESCRIPTORS: *Satellite vehicle trajectories, Catalogs, Orbital flight paths, Tracking, Corrections.

This analysis lists observations of Satellites 1960 Beta 1, Beta 2, Gamma 1, Gamma 2, Eta 1, Eta 2, Eta 3, XI 1, XI 2, Omicron, and Sigma. Observations were made to test the lights carried aboard these satellites which were programmed to turn on over selected SAO Baker-Nunn stations. (Author)

AD-262 448 Div. 12, 5
(5 Sep 61) OTS price $2.60

Radiation Inc., Palo Alto, Calif.
STATIC REFLECTIVITY MEASUREMENTS OF 12 FOOT DIAMETER INFLATABLE SATELLITE.
1 July 61, 17p. incl. illus. (Rept. no. 6458)
(Subcontract to General Mills Co., Contract AF 30(602)2453)
(RADC TR 61-181) Unclassified report

DESCRIPTORS: *Satellite vehicles, *Balloons, Reflection, Measurement, *Radar reflections, Polarization, K band, S band, Test methods, Tests, *Communication systems, Radar echo areas, Model tests.

Measurements are presented of the bistatic radar reflectivity characteristics of a 12-foot passive satellite. The measurements were made using vertical and horizontal polarizations and using scale model techniques to simulate frequencies of 400 and 2270 mcs. (Author)

Division 12 - GUIDED MISSILES

AD-262 455 Div. 12, 27
(5 Sep 61) OTS price $2.60

Wyle Research Corp., El Segundo, Calif.
PARTIAL QUALIFICATION TEST OF TITAN I ENGINE COMPONENT THRUST CHAMBER ASSEMBLY CONTROLS, AEROJET-GENERAL CORPORATION, SACRAMENTO, CALIFORNIA,
by L. N. Mortenson and R. B. Clark. 15 June 61, 19p. incl. illus. tables (Test rept. no. 9532-5)
(Contract AF 04(647)398)
(AFBSD TR 61-56) Unclassified report

DESCRIPTORS: Tests, Simulation, Flight, Guided missiles, Surface to surface, Valves, Calibration, Instrumentation, *Rocket motors, *Combustion chambers, High pressure valves, Control valves, Test methods, Control, Test equipment.

Purpose of this program was to subject one assembly of the Titan I first stage thrust chamber controls to the flight simulation test phase of a qualification test program. A detailed description of the test program, along with the test equipment employed in the performance of the test program is included. (Author)

AD-262 468 Div. 12, 6
(6 Sep 61) OTS price $3.60

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
LIST OF COORDINATES OF STATIONS ENGAGED IN THE OBSERVATION OF ARTIFICIAL EARTH SATELLITES.
Rept. on Research in Space Science,
by D. V. Mechau. 17 July 61, 36p. incl. tables.
(Special rept. no. 69)
Unclassified report

DESCRIPTORS: *Satellite vehicle trajectories, Tracking, *Direction finding stations, Tables, Orbital flight paths.

A numerical listing is given of the numbers, names, geographical coordinates, and heights of stations engaged in the observation of artificial earth satellites. (Author)

AD-262 469 Div. 12, 9
(6 Sep 61) OTS price $2.60

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
THE MOTION OF SATELLITE 1958 EPSILON AROUND ITS CENTER OF MASS.
Rept. on Research in Space Science,
by G. Colombo. 18 July 61, 26p. incl. illus.
(Special rept. no. 70)
Unclassified report

DESCRIPTORS: *Satellite vehicle trajectories, *Orbital flight paths, Motion, Perturbation theory, Rotation, Drag, Numerical analysis.

A preliminary study is made of the motion of Explorer IV (Satellite 1958 Epsilon) around its center of mass. The body is, to a good approximation, symmetric around its longitudinal axis (A) and, therefore, the tangential motion can be considered a regular precession, at least during one orbital revolution. Many good observations of the motion, especially of the variation of (A), were made during the first 60 days after launch, and the variation in the direction of the precessional axis was computed. Although the determinations are not precise, they definitely indicate an angular displacement of the precessional axis of at least 10 degrees per day in the first 30 days after launch. Also, it is certain that the angular momentum of the body remained almost constant during the whole period under consideration. (Author)

AD-262 470 Div. 12
(6 Sep 61) OTS price $3.60

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
ELEMENTS OF THE ORBIT OF THE SATELLITE 1959 ETA (VANGUARD III) DURING THE FIRST YEAR AFTER LAUNCHING.
Rept. on Research in Space Science,
by P. E. Zadunaisky and B. Miller. 24 July 61, 31p. incl. illus. tables (Special rept. no. 71)
Unclassified report

DESCRIPTORS: *Satellite vehicle trajectories, *Orbital flight paths, Tracking, Tables, Drag.

Satellite 1959 Eta (Vanguard III) was launched on September 18, 1959. The mean elements of its orbit calculated for every day during a period of one year after launch time are tabulated. In this computation, Baker-Nunn field-reduced observations are used mainly. Minitrack observations were also included in the computations during the interval between launch time and December 11, 1960, when the radio transmitters ceased to operate. The computations were made by an iterative differential correction process. (Author)

AD-262 538 Div. 12
(14 Sep 61) OTS price $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE JUNO PROGRAM.
1961, 24p. incl. illus.
Unclassified report

DESCRIPTORS: Guided missiles, *Satellite vehicles, *Re-entry vehicles, Re-entry aerodynamics, Hypersonics, Test vehicles, Research test vehicles, Communication systems, *Space probes, Tracking, Booster rockets, Surface to surface, Staging, Launching.

The code name JUNO was given to a series of scientific Earth-satellite and space-probe firings conducted cooperatively by the the Army Ballistic Missile Agency and the Jet Propulsion Laboratory as part of the United States' participation in the International Geophysical Year program. The one common denominator of the entire JUNO program was the spinning cluster of JPL high-speed stages that were mounted on top of both the Redstone and Jupiter vehicles. The high-speed stages were originally proposed in the Project Orbiter studies of 1954-55, and were developed initially for the RTV program of 1955-57. (Author)

AD-262 543 Div. 12, 9
(7 Sep 61) OTS price $10.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
REENTRY PHYSICS AND PROJECT PRESS PROGRAMS.

Semiannual technical summary rept. no. 5, 1 Jan-30 June 61.
3 Aug 61, 137p. incl. illus. tables.
(Contract AF 19(604)7400)
(ARPA Order nos. 13-61 and 166-61)
Unclassified report

DESCRIPTORS: *Re-entry vehicles, Atmosphere entry, *Plasma physics, Electrons, Density, Radar tracking, Gas flow, *Re-entry aerodynamics, *Magnetohydrodynamics, S band, Ultra high frequency, Refraction, *Optical tracking.

Contents:
Flow field studies
Electronic properties of re-entry plasmas
Electromagnetic interactions with re-entry plasmas
Experimental program at Wallops Island
The Press program

AD-262 566 Div. 12, 31
(7 Sep 61) OTS price $4.60

Naval Weapons Lab., Dahlgren, Va.
TARTAR STRUCTURAL FIRING TEST ABOARD THE USS CHARLES F. ADAMS (DDG-2),
by J. W. Loving, T. I. Dodson, and others.
15 Aug 61, 47p. incl. illus. tables (NWL rept. no. 1770)
Unclassified report

DESCRIPTORS: *Guided missiles, Surface to air, Guided missile lanchers, Test vehicles, Launching, Shipborne, Rocket motors, *Blast, Measurement, Tests, Test methods, Structures, Gas leaks, Safety, Destroyers, Guided missile personnel, Damage control, *Explosion damage, Poisonous gases, Noise, Temperature, Exhaust flames, Ship decks, Hazards, Booster rockets, Guided missile boosters.

Eight TARTAR Mk 1 Mod 0 dual-thrust rocket motors with concrete slugs were fired aboard the USS Charles F. Adams (DDG-2) to investigate the adequacy of the protection for the Tartar launching system personnel against blast effects and to determine the effects of the booster blast on the ship's structure. The test vehicles were fired at various angles such that the exhaust stream was directed at areas thought to impose the most severe conditions on the ship's structural components and equipment. Measurements were made of structural strains, toxic gas concentrations, noise levels, flame penetrations at door and port seals, temperature changes inside the ship and in the blast area of the 01 level and the main deck. High-speed motion pictures were taken on all tests. The results indicated severe gas leakage into mount 52 and other areas adjacent to the launcher and minor damage to mechanical parts of the launching system. A detailed description of all data obtained and ship damage incurred is included. (Author)

AD-262 599 Div. 12
(7 Sep 61) OTS price $1.60

Aerospace Technical Intelligence Center,
Wright-Patterson Air Force Base, Ohio.
ON ROCKET AIRCRAFT INTO SPACE,
by N. Romanov. 1 Aug 61, 12p. incl. illus.
(Trans. no. MCL-607 of Grazhdanskaya Aviatsiya, pp. 13-15 and 27, Oct 59)
Unclassified report

DESCRIPTORS: Technological intelligence, USSR, Translations, *Hypervelocity vehicles, Satellite vehicles, Manned, Re-entry vehicles, Flight paths, Rocket motors, Space flight, Liquid rocket propellants, *Astronautics.

The development of space flights confronts science and technology with many complex problems in the domain of designing and engineering. One of these problems, which is most difficult, consists in launching the manned flying craft and returning them to the Earth. In conjunction with this fact there is an increasing interest in hypersonic flying craft which constitutes seemingly a missing link between modern aircraft and the future space ships. These flying craft represent a combination of the glider and the rocket powerplant and are called quite frequently the hypersonic rocket aircraft. They are capable of developing a speed exceeding by many times the speed of sound. The concept of a rocket aircraft is based on the following proposition: the acceleration of the glider in the initial section of the trajectory to hypersonic speeds, exceeding the speed of sound by the factor of 7 and more, results in the accumulation of such an amount of kinetic and potential energy which can insure a further flight over a tremendous distance without any additional application of thrust. (Author)

AD-262 609 Div. 12
(7 Sep 61) OTS price $3.60

Aerospace Technical Intelligence Center,
Wright-Patterson Air Force Base, Ohio.
A METHOD FOR IMPROVING THE ORBITS OF ARTIFICIAL EARTH SATELLITES USING OBSERVATIONS WHEN THE TIME IS ONLY APPROXIMATELY KNOWN,
by D. K. Kulikov and Yu. V. Batrakov. 7 Aug 61, 30p. incl. illus. tables (Trans. no. MCL-1115 of Byulleten' Instituta Teoreticheskoy Astronomii 7:554-569, 1960)
Unclassified report

DESCRIPTORS: *Satellite vehicles, *Orbital flight paths, Corrections, Time, Errors, Determination, Differential geometry, Geodesics, Satellite vehicle trajectories, Analysis, USSR.

A method is given for improving the orbital elements of artificial satellites when the observation times are only approximately known. Corresponding conditional equations are derived, one of which is independent of time error. It is shown that some orbital elements can be determined from the equations which are independent of time errors, and the optimum conditions for determining these elements are analyzed. Conditional equations are given for corrections in the absolute coordinates of observational stations, and these equations are analyzed. An example is given using this method for improving the orbital elements of artificial satellites. (Author)

AD-262 610 Div. 12
(7 Sep 61) OTS price $1.10

Aerospace Technical Intelligence Center,
Wright-Patterson Air Force Base, Ohio.
ARTIFICIAL COMET,
by V. F. Yesipov and V. I. Moroz. 7 Aug 61, 2p.
(Trans. no. MCL-1117 of Astron. Tsirkulyar 205: pp. 1, Oct 59)
Unclassified report

DESCRIPTORS: *Comets, Simulation, Sodium, Vapors, Upper atmosphere, *Rockets, USSR, *Tracking, *Photographic analysis.

Division 12 - GUIDED MISSILES

In order to determine the coordinates of the second Soviet cosmic rocket by methods of optical astronomy, a cloud of sodium vapor, a so-called artificial comet, was released from the rocket. The artificial comet was formed on September 12, 1959 at 21 hr 49 min 30 sec. Twin photographic cameras and electronic telescopes were developed to observe the artificial comet. Fourteen photographs of successive stages of the expansion of the sodium cloud were obtained. The expansion velocity was of the order of 2 km/sec, and the diameter of the cloud at the end of the observations reached 1200 km. The large number of exposures makes it possible to trace the entire picture of the development of a sodium cloud. (Author)

AD-262 618 Div. 12, 1
(8 Sep 61) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
AN ANNOUNCEMENT ON THE FLIGHT OF YURI GAGARIN.
8 Aug 61, 4p. (Trans. no. MCL-1147 of Komsomol'skaya Pravda 88, (11018), pp. 1, 13 Apr 61)
Unclassified report

DESCRIPTORS: *Space flight, *USSR, Manned, Spaceships, Astronautics.

AD-262 619 Div. 12
(8 Sep 61) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
MAN IN UNIVERSE,
by Galaktion Michajlov. 8 Aug 61, 11p. (Trans. no. MCL-1154 of Letecky Obzor 5:130-132, 1961.
Unclassified report

DESCRIPTORS: *Space flight, Manned, USSR, Space probes, Space environmental conditions.

AD-262 621 Div. 12
(8 Sep 61) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
THE SECOND SPACESHIP.
8 Aug 61, 4p. (Trans. no. MCL-1159 of Radio 10:pp. 3, 1960)
Unclassified report

DESCRIPTORS: *Spaceships, USSR, Launching, Telemetering data, Effectiveness, Television communication systems, Instrumentation, Reliability, Orbital flight paths.

AD-262 631 Div. 12
(8 Sep 61) OTS price $1.60

Allied Research Associates, Inc., Boston, Mass.
LAUNCHING OF AIRBORNE MISSILES UNDERWATER. PART XII. EFFECT OF TOTAL MISSILE RESPONSE TO CONFUSED SEAS ON OPTIMUM SUBMARINE HEADING,
by Theodore R. Goodman. 1 Sep 61, 17p. incl. illus., 8 refs. (Document no. ARA-983)
(Contract Nonr-234300)
Unclassified report

DESCRIPTORS: *Launching, Probability, Statistical processes, Submarines, Guided missile trajectories, Ocean currents, Underwater to air, Ocean waves, *Guided missiles, Mathematical analysis.

The probability that a certain missile trajectory response falls within a circular region is determined by assuming the response to be Gaussian. The submarine-missile system is not assumed to be axially symmetric about a vertical axis as was done in earlier work on the optimization problem. Because axial symmetry is not present, the shape and size of the probability density function changes as the submarine heading is varied. The form of the dependence of the elements of the response tensor on submarine heading is adopted here. By making suitable approximations to the probability function itself, simple relations are obtained for the optimum heading under all sea and launch conditions. (Author)

AD-262 649 Div. 12, 6
(8 Sep 61) OTS price $6.60

General Dynamics/Convair, San Diego, Calif.
SPACE-TIME SAMPLING AND FILTERING.
Semi-annual technical documentary note, by W. D. Montgomery and P. W. Broome. May 61, 66p. incl. illus. (Rept. no. ZR-AP-061-16)
(Contract AF 04(647)644)
(ARPA Order no. 153-60)
Unclassified report

DESCRIPTORS: *Guided missile tracking systems, Satellite vehicles, Detection, *Optical systems, *Optical filters, Optical images, Launching, Sampling, Mathematical prediction, Mathematical analysis, Simulation, Photoelectric cells, Topology, Statistical functions, Guided missiles, Intensity, *Infrared optical systems.

This study is oriented toward enhancing the detection of a missile launch as seen from a satellite. Some preliminary considerations of satellite altitude, wave lengths viewed, and optical system used, show up the more important characteristics of the problem on the image plane of the optical system. Considering the intensity distribution on this plane as the input, three important spatial filters are developed, having two-dimensional outputs. The first filter is a linear one whose simulation on an IBM 7090 used a localized target against a random and nonrandom background. The inputs and outputs are shown. The second filter, a general statistical one, has considerable discrimination ability but needs a large amount of statistical information of the background. The third filter, developed along the lines of decision theory, turns out to be remarkably similar to the general one. For each filter the application to multiple wave lengths as well as to point source and nonpoint source targets is considered. The use of several filters combined in a serial or parallel fashion is mentioned. (Author)

AD-262 781 Div. 12, 9
(12 Sep 61) OTS price $6.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
AERODYNAMIC HEATING OF SPACECRAFT DURING ENTRY INTO A PLANETARY ATMOSPHERE: AN ANOTATED BIBLIOGRAPHY,

comp. by Robert C. Gex. June 61, 62p., 150 refs.
(Special bibliography SB-61-30)
(Contract AF 04(647)673)
Unclassified report

DESCRIPTORS: *Re-entry vehicles, *Aerodynamic heating, Aerodynamics, Hypersonics, *Bibliography, *Spaceships, *Satellite vehicles, *Guided missiles, Ablation, Heat transfer, *Hypervelocity vehicles, *Re-entry aerodynamics, Atmosphere entry.

Considerable literature has been published on the re-entry heating of ballistic missiles. The orbiting satellite and interplanetary probe present new problems in aerodynamic heating, e.g. different configurations and trajectories. These abstracted references are the result of a literature search for information on the spacecraft re-entry problem. The literature on re-entry heating encountered on ballistic missile trajectories is excluded. (Author)

AD-262 944 Div. 12, 30, 2
(13 Sep 61) OTS price $14.50

RCA Defense Electronic Products, Princeton, N. J.
TIROS I METEOROLOGICAL SATELLITE SYSTEM.
VOLUME I,
Final comprehensive technical rept.
1 July 61, 213p. incl. illus. tables (Rept. no. AED-339, vol. 1)
(Contract DA 36-039-sc-78902)
Unclassified report

DESCRIPTORS: Meteorological data, Collecting methods, *Satellite vehicles, Operation, *Instrumentation, Effectiveness, Television communication systems, Telemetering data, Tests, Reliability.

This analysis on the TIROS I Meteorological Satellite System includes detailed discussions of the development, design, test, and operation of portions of the system. These portions include the satellite, in its entirety, and the major part of the (ground based) Command and Data-Acquisition Stations. Five identical satellites, and three essentially-similar sets of ground-station equipment were fabricated for the TIROS I project. Specific units are discussed only where differences in handling, scheduling, or operation are of importance. (Author)

AD-262 945 Div. 12, 30, 2
(13 Sep 61) OTS price $16.00

RCA Defense Electronic Products, Princeton, N. J.
TIROS I METEOROLOGICAL SATELLITE SYSTEM. VOLUME II.
Final comprehensive technical rept. on volume 2.
1 July 61, 241p. incl. illus. tables (Rept. no. AED-339, vol. 2)
(Contract DA 36-039-sc-78902)
Unclassified report

DESCRIPTORS: Meteorological data, Collecting methods, *Satellite vehicles, *Instrumentation, Operation, Effectiveness, Television communication systems, Telemetering data, Tests, Reliability.

AD-262 946 Div. 12, 30, 2
(13 Sep 61) OTS price $13.50

RCA Defense Electronic Products, Princeton, N. J.
TIROS I METEOROLOGICAL SATELLITE SYSTEM.
VOLUME III.
Final comprehensive technical report on volume 3,
1 July 61, 194p. incl. illus. tables (Rept. no. AED-339, vol. 3)
(Contract DA 36-039-sc-78902)
Unclassified report

DESCRIPTORS: Meteorological data, Collecting methods, *Satellite vehicles, Operation, *Instrumentation, Effectiveness, Television communication systems, Telemetering data, Tests, Reliability.

AD-262 988 Div. 12, 28, 23
(15 Sep 61) OTS price $4.60

6593d Test Group (Dev) Air Force Systems Command, Edwards Air Force Base, Calif.
A SAMPLE EVALUATION OF HUMAN ENGINEERING IN AIR FORCE BALLISTIC MISSILE PROGRAMS,
by Glory Sturiale. Aug 61, 37p. incl. illus.
(BSD TN 61-11) Unclassified report

DESCRIPTORS: *Human engineering, *Job analysis, Effectiveness, *Guided missile personnel, Guided missiles, Surface to surface, Aircraft equipment, Maintenance, Design, Control panels, Control systems, Indicator lights, Reliability, Costs, Military requirements.

A human engineering evaluation was made of the Titan R and D Preflight Checker and Controller. The results are presented for the purpose of providing evidance signifying inadequacies in human engineering efforts within the Air Force ballistic missile programs. This evaluation includes a review of Air Force human engineering contractor requirements. Human engineering problems concerning the equipment evaluated include: the kind of modular packaging used; maintenance and accessibility of internal components; the use of failure-prone and expensive transilluminated indicator lights; inaccessible heights of racks; and other discrepancies of certain exterior design features such as controls, panel layout. Establishment of a short practical human engineering training course; assigning certain human engineering monitoring responsibilities to Air Force engineers; and reviewing the effectiveness of allocation of manpower to management functions on the one hand and operational activities on the other, within the ballistic missile personnel subsystem programs is described. (Author)

AD-263 042 Div. 12, 8, 25, 27, 23
(18 Sep 61) OTS price $9.60

Autonetics, Downey, Calif.
BIBLIOGRAPHY OF BOOKS PERTAINING TO SYSTEMS ENGINEERING,
comp. by Beatrice H. Nagel. 1 Aug 61, 116p.
(Rept. no. EM-6761)
Unclassified report

DESCRIPTORS: Control systems, *Computers, *Electromagnetic waves, Wave transmission, Electronic equipment, Data processing systems, Digital computers, Analog computers, Electromagnetism, *Mechanics, Dynamics, Aerodynamics, *Navigation, Astronautics, Aeronautics, *Propulsion, Ionization, Gas ionization, Plasma physics, Sound, *Satellite vehicles, Stars, Ionosphere, Atmosphere, Astrophysics, Solar systems, *Electronics, Electronic circuits, Printed circuits, Circuits, Oscillators, Guided missiles, Rockets, *Bibliography, Cybernetics, Electromagnetic theory.

A list of books is presented on systems engineering to provide a reference from which selections for the Autonetics Research Library will be made and to serve as book literature background for scientists engaged in research involving space technology, electronics and components and control engineering. Selections for this collection were compiled from Books in Print - 1960, current scientific society publication book reviews, book review sections of major periodicals and a survey of publishers' brochures and catalogues. Most books cited fall in the advanced category although introductory works are included. Recent books, 1957 - 1961, predominate but some older texts appear. The bibliography is arranged according to fields of interest. These include: control, computers, electromagnetic radiation, power, mechanics, navigation, propulsion, sound, space technology, electronics and circuitry, and missiles. Books are listed under the subject to which they apply and as a result a specific reference may appear several times. (Author)

AD-263 071 Div. 12, 9, 25
(18 Sep 61) OTS price $.50

National Aeronautics and Space Administration, Washington, D. C.
INTERACTION OF A CHARGED SATELLITE WITH THE IONOSPHERE,
by A. H. Davis and I. Harris. Sep 61, 7p. incl. illus. table (NASA Technical note no. D-704)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note no. D-704.

DESCRIPTORS: *Satellite vehicles, *Ionosphere, Shock waves, Ions, Gas flow, *Drag, Numerical methods and procedures.

The problem of the ion density distributions around a charged satellite has been treated by a numerical method which does not require linearization of the equations or restriction to infinitesimal objects. However, magnetic field effects were not considered, and a number of other simplifying assumptions were required. Some sample calculations for spherical satellites are presented, illustrating the general character of the satellite wake. Calculations of the so-called charge drag were also made, yielding results qualitatively similar to those previously obtained by Jastrow and Pearse (J. Geophys. Res. 62(3):413-423, 1957). (Author)

AD-263 072 Div. 12
(18 Sep 61) OTS price $1.00

National Aeronautics and Space Administration, Washington, D. C.
LANDING CHARACTERISTICS OF A LENTICULAR-SHAPED RE-ENTRY VEHICLE,
by Ulysse J. Blanchard. Sep 61, 35p. incl. illus. tables (NASA Technical note no. D-940)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note no. D-940.

DESCRIPTORS: *Re-entry vehicles, *Landing, Model tests, Aerodynamic configurations, Water tunnels, Water entry, Landing fields, *Landing impact, Hydra-skis, Flaps, Shielding.

Hard-surface landing characteristics of a lenticular-shaped re-entry vehicle obtained with the curved lower surface (heat shield) used as a skid-rocker were good and resulted in maximum normal and angular accelerations of 5g and 18 radians per second squared, respectively, over a range of landing conditions. Horizontal landings in water resulted in large and violent rebounds or dives, depending on the sea conditions or the point of the wave contacted. The nature of the rebounds was such that the attitude of subsequent impacts was random. The maximum longitudinal accelerations obtained in water landings were 10g, maximum normal accelerations were 21g, and maximum angular accelerations were 145 radians per second squared, in waves 7 ft. high (sea state 4). Various auxiliary water-landing devices tested produced no practical improvement in behavior. Reduction of horizontal speed and positive control of impact attitude did improve performance in calm water. During vertical landings (90 degrees flight path) in calm water maximum longitudinal accelerations were 9g, maximum normal accelerations were 15g, and maximum angular accelerations were 110 radians per second squared for a contact attitude of -45 degrees and a vertical velocity of 70 ft. per sec. (Author)

AD-263 073 Div. 12
(18 Sep 61) OTS price $.75

National Aeronautics and Space Administration, Washington, D. C.
INVESTIGATION OF A RETROROCKET EXHAUSTING FROM THE NOSE OF A BLUNT BODY INTO A SUPERSONIC FREE STREAM,
by Nickolai Charczenko and Katherine W. Hennessey. Sep 61, 30p. incl. illus. (NASA Technical note no. D-751)
Unclassified report

Also available from NASA, Wash. 25, D. C. as NASA Technical note no. D-751.

DESCRIPTORS: *Blunt bodies, Bodies of revolution, Re-entry vehicles, Model tests, *Deceleration, Satellite vehicles, Recovery, Supersonic flow, Drag, Pressure, *Re-entry aerodynamics, *Retro rockets, Exhaust gases, Jets, Thrust.

The pressure distribution and pressure drag of a blunt body with a supersonic jet issuing upstream from its center were determined at free-stream Mach numbers of 1.60, 2.00, and 2.85. The thrust of the jet issuing from the model nose was varied to study its effects on flow around the model and to determine variation of pressure distribution and pressure drag of the model with the thrust. At all Mach numbers investigated, the pressure drag decreased with increasing retrorocket thrust until a minimum value was reached. Further increases in retrorocket thrust resulted in increases in the pressure drag. The resultant drag (pressure drag plus retrorocket thrust but excluding base and skin-friction drag) of the model was reduced by retrorocket operation below

the drag for a jet-off condition, except at very low retrorocket thrust coefficients. The flow about the nose of the blunt body was very unstable throughout the range of Mach numbers and retrorocket thrust coefficients investigated. (Author)

AD-263 076 Div. 12, 9
(18 Sep 61) OTS price $1.75

National Aeronautics and Space Administration, Washington, D. C.
AERODYNAMIC LOADING CHARACTERISTICS AT MACH NUMBERS FROM 0.80 TO 1.20 OF A 1/10-SCALE THREE-STAGE SCOUT MODEL,
by Thomas C. Kelly. Sep 61, 64p. incl. illus. tables (NASA Technical note no. D-945)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note no. D-945.

DESCRIPTORS: Aerodynamics, *Load distribution, Transonics, Mach number, *Staging, Supersonics, *Research test vehicles, Booster rockets, Pressure, Space probes, Re-entry aerodynamics, Airplane protuberances, Transonic wind tunnels, Model tests, Tests.

Aerodynamic loads results have been obtained in the Langley 8-foot transonic pressure tunnel at Mach numbers from 0.80 to 1.20 for a 1/10-scale model of the upper three stages of the Scout vehicle. Tests were conducted through an angle-of-attack range from -8 to 8 degrees at an average test Reynolds number per foot of about 4.0 x 10 to the 6th power. Results indicated that the peak negative pressures associated with expansion corners at the nose and transition flare exhibit sizeable variations which occur over a relatively small Mach number range. The magnitude of the variations may cause the critical local loading condition for the full-scale vehicle to occur at a Mach number considerably lower than that at which the maximum dynamic pressure occurs in flight. The addition of protuberances simulating antennas and wiring conduits had slight, localized effects. The lift carryover from the nose and transition flare on the cylindrical portions of the model generally increased with an increase in Mach number. (Author)

AD-263 078 Div. 12, 25
(18 Sep 61) OTS price $1.25

National Aeronautics and Space Administration, Washington, D. C.
ANALYSIS OF A LINEAR SYSTEM FOR VARIABLE-THRUST CONTROL IN THE TERMINAL PHASE OF RENDEZVOUS,
by Richard A. Hord and Barbara J. Durling. Sep 61, 43p. incl. illus. (NASA Technical note no. D-953)
Unclassified report

Also available from NASA, Wash. 25, D. C. as NASA Technical note no. D-953.

DESCRIPTORS: Spaceships, *Satellite rendezvous vehicles, *Thrust, Linear systems, *Celestial mechanics, Satellite vehicles, Mathematical analysis, Differential equations, Velocity, Acceleration, Satellite vehicle trajectories, Ballistics.

A linear system for applying thrust to a ferry vehicle in the terminal phase of rendezvous with a satellite is analyzed. This system requires that the ferry thrust vector per unit mass be variable and equal to a suitable linear combination of the measured position and velocity vectors of the ferry relative to the satellite. The variations of the ferry position, speed, acceleration, and mass ratio are examined for several combinations of the initial conditions and two basic control parameters analogous to the undamped natural frequency and the fraction of critical damping. Upon making a desirable selection of one control parameter and requiring minimum fuel expenditure for given terminal-phase initial conditions, a simplified analysis in one dimension practically fixes the choice of the remaining control parameter. The system can be implemented by an automatic controller or by a pilot. (Author)

AD-263 080 Div. 12, 9
(18 Sep 61) OTS price $.75

National Aeronautics and Space Administration, Washington, D. C.
HEAT TRANSFER AND BOUNDARY-LAYER TRANSITION ON A HIGHLY POLISHED HEMISPHERE-CONE IN FREE FLIGHT AT MACH NUMBERS UP TO 3.14 AND REYNOLDS NUMBERS UP TO 24 X 106,
by James J. Buglia. Sep 61, 26p. incl. illus. 13 refs. (NASA Technical note no. D-955; Supersedes NACA Research memo. no. L57D05, AD-128 636)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note no. D-955.

DESCRIPTORS: *Heat transfer, *Boundary layer, *Rocket noses, Laminar boundary layer, Model tests, Blunt bodies, *Conical bodies, *Hemispherical shells, Flight testing, Booster rockets, Temperature, Pressure, Supersonics, Re-entry aerodynamics.

A highly polished hemisphere-cone having a ratio of nose radius to base radius of 0.74 and a half-angle of 14.5 degrees was flight tested at Mach numbers up to 4.70. Temperature and pressure data were obtained at Mach numbers up to 3.14 and a free-stream Reynolds number of 24 x 10 to the 6th power based on body diameter. The nose of the model had a surface roughness of 2 to 5 microinches as measured an interferometer. The measured Stanton numbers were in good agreement with theory. Transition Reynolds numbers based on the laminar boundary-layer momentum thickness at transition ranged from 2,190 to 794. Comparison with results from previous tests of blunt shapes having a surface roughness of 20 to 40 microinches showed that the high degree of polish was instrumental in delaying the transition from laminar to turbulent flow. (Author)

13. INSTALLATIONS AND CONSTRUCTION

AD-262 516 Div. 13, 22, 8, 12, 30, 26
(7 Sep 61) OTS price $2.60

Frankford Arsenal, Philadelphia, Pa.
STUDY ON THE APPLICATION OF MULTIPURPOSE AUTOMAT-

IC INSPECTION AND DIAGNOSTIC SYSTEMS (MAIDS) TO ARMY MAINTENANCE SYSTEM IN THE PERIOD 1962-72.
Progress rept. no. 2.
31 July 61, 19p. incl. illus.
Unclassified report

DESCRIPTORS: *Weapons, *Vehicles, *Maintenance equipment, Mobile, Tests, *Armament, *Guided missiles, *Electronic equipment, *Inertial guidance, *Instrumentation, Test methods, Computers, Automation, *Maintenance.

AD-263 041 Div. 13, 20
(14 Sep 61) OTS price $13.50

Pennsylvania State U., University Park.
GUIDEBOOK FOR THE PLANNING OF INTEGRATED ATOMIC DEFENSE SHELTERS IN SELECTED MILITARY BUILDING TYPES.
by Gifford H. Albright, Allen F. Dill, and others. 15 Feb 61, 193p. incl. illus. tables.
(Contract NBy-3188)
Unclassified report

DESCRIPTORS: *Shelters, *Housing, Construction, Military engineering, Nuclear explosions, Atomic bomb explosions.

14. MATERIALS (NON-METALLIC)

AD-262 565 Div. 14
(7 Sep 61) OTS price $1.60

National Bureau of Standards, Washington, D. C.
IGNITION OF SOME WOODS EXPOSED TO LOW LEVEL THERMAL RADIATION,
by A. J. Buschman. 26 July 61, 16p. incl. illus. tables (Technical rept. no. 1)
(Contract NAonr 24-60, Proj. NR 051-421)
Unclassified report

DESCRIPTORS: *Wood, *Thermal radiation, Ignition, Flames, Tests.

Critical intensities for the pilot ignition of some common materials have been determined. An effort is made to correlate data from a flame-spread test in which the specimen is subjected to a non-uniform radiant exposure with data from the pilot ignition of uniformly irradiated specimens in order to understand the effect of the presence of a flame. Intensity of irradiation and time of ignition have been employed in computation of surface temperatures at the time of ignition. Equations are presented which show the dependence of ignition time and surface temperature upon the physical and thermal properties of density, conductivity, and specific heat. (Author)

AD-262 716 Div. 14, 17
(11 Sep 61) OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
ADHESIVES FOR BONDING ALUMINUM,
by Hugh C. Anderson. June 61, 12p. incl. illus. tables.
(NAVWEPS rept. no. 7378)
Unclassified report

DESCRIPTORS: *Aluminum, Alloys, Bonding, *Adhesives, Tensile properties, *Epoxy resins, Preparations, Test methods, Adhesion, Surface properties, Tests, Determination, Metal joints, Joints, *Aluminum alloys, *Resin adhesives, Bonded joints.

The tensile adhesive strengths of adhesive/aluminum systems comprising five commercial epoxy adhesives and four aluminum alloys have been determined. Both standard lap-shear and NOL butt-joint specimens fabricated from 2024-T4 aluminum. The four different aluminum alloys were evaluated, using lap-shear specimens with two of the five adhesives. Both the lap-shear and butt-joint adherends were subjected to two types of surface preparation before assembly. One group was abraded with carborundum paper, and the other group was given an acid etch in addition to the abrasion. Before testing, the lap-shear specimens were exposed to two types of environmental conditioning, viz., normal conditioning and 28-day Jan cycling. In general, acid etching improved the tensile strengths of all the systems. V-Bond 214 adhesive produced the strongest joint. Jan cycling of the specimens caused a reduction in strength of from 40 to more than 60%. (Author)

AD-262 727 Div. 14, 13
(11 Sep 61) OTS price $5 60

Structural Mechanics Research Lab., U. of Texas, Austin.
DYNAMIC ENERGY-ABSORBING CHARACTERISTICS OF LIGHTWEIGHT VERMICULITE CONCRETE,
by Clarke Covington. June 61, 51p. incl. illus. tables.
(Contract DA 49-146-XZ-028)
(DASA-1238) Unclassified report

DESCRIPTORS: *Concrete, *Underground structures, Shock waves, Blast, Absorption, *Impact shock, Nuclear explosions, Atomic bomb explosions, Vulnerability, *Shock, *Shelters, Test methods, Construction, Cements, Stresses, Deformation, Vibration isolators, Vermiculite.

The dynamic energy-absorption characteristics of confined lightweight vermiculite concrete are presented in the form of stress-strain and stress-time curves. In addition, data are included which show the effects of impact velocity and impact mass weight on these characteristics. Stress-strain and energy-absorption characteristics are discussed. A comparison is made between a dynamic and a static stress-strain curve for this material. For a cement to vermiculite mix of 1 to 8, the initial peak crushing stress is between 420 and 570 psi, and the average crushing stress to 30% strain is between 350 and 450 psi. The energy dissipated to 30% strain is between 8.8 and 10.9 ft-lb/cu in. (Author)

AD-262 766 Div. 14
(12 Sep 61) OTS price $2.60

Forest Products Lab., Madison, Wis.
DEVELOPMENT OF ADHESIVES WITH IMPROVED HEAT RESISTANCE IN BONDS OF STAINLESS STEEL.

Final rept.,
by J. M. Black and R. F. Blomquist. July 61,
21p. incl. illus. tables (Report no. 1883)
(Contract NAer-01967)
Unclassified report

DESCRIPTORS: *Stainless steel, Bonding, *Adhesives, *Heat resistant polymers, Additives, Epoxy resins, Aluminum, Arsenic compounds, Oxides, Vinyl radicals, Amines, Polymers, Resins, Amides, *Adhesive tapes, Powder metals, Cyanuric acid, *Resin adhesives, Metal joints, Joints, Bonded joints.

Adhesives containing combinations of polyamide resin with melamine compounds, epoxy resins with vinyl anhydride copolymers, and inorganic fillers were studied as heat-resistant bonding agents for stainless steel. Attempts to improve the strength of the polyamide-melamine type adhesive at 550 F. were unsuccessful. Studies were made of the heat-resistant properties of eight different epoxy resins modified with an ethyl acrylate-maleic anhydride copolymer and with maleic anhydride. (Author)

AD-262 767 Div. 14
(12 Sep 61) OTS price $1.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
THE MANUFACTURE OF DYEABLE TEFLON BY MEANS OF IRRADIATION GRAFT COPOLYMERIZATION,
by J. Dobo, A Somogyi and E. Lakner, tr. by Alex Palinkas. Aug 61, 16p. incl. illus. tables. (Technical notes no. FRL-TN-74; Trans. from Magyar Kemiai Folyoirat 67:85-90(1961))
Unclassified report

DESCRIPTORS: *Ethylenes, Fluorides, Polymers, Acetates, Vinyl radicals, Dyes, Mechanical properties, Determination, Temperature, Methyl radicals, Styrenes, *Copolymerization, X rays, Tensile properties, Manufacturing methods, Structures, Preparation, Acrylic resins, Radiation effects, Pyridines, Plastics.

Teflon films can be dyed by radiation grafting. Examination was made of the circumstances of grafting and dyeing, using the monomers vinyl acetate, methyl methacrylate, vinyl pyridine, and styrene. Dyeing gives a graphic picture of the location and distribution of the grafted lateral branches on and beneath the surface of the film. In radiation chemical grafting, small amounts of grafted polymer are sufficient to produce fully dyeable teflon films without appreciable sacrifice of mechanical qualities.

AD-262 796 Div. 14
(12 Sep 61) OTS price $6.60

Material Lab., New York Naval Shipyard, Brooklyn.
REPORT OF INVESTIGATION OF OUTDOOR WEATHER AGING OF PLASTICS.
Final rept.,
by S. E. Yustein. 16 June 61, 66p. incl. illus. tables (Lab. proj. no. 4860-G-3)
Unclassified report

DESCRIPTORS: *Plastics, *Laminates, *Resins, Acrylic resins, Phenolic resins, Cellulose acetates, Aging, Climatic factors, Deterioration, Failure (Mechanics), Mechanical properties, Surface properties, Photographic analysis, *Transparent panels, Light transmission, Dielectrics, Vinyl radicals, Allyl radicals.

A study was made of outdoor weather aging of transparent and laminated plastic after a 10 yr. period at New York with specimens previously weather aged 3 mo to 3 yrs. The original 3 yr. program provided for weather aging under various weather conditions: Panama Canal Zone, New Mexico, New York City, Fort Churchill, Canada and Alaska. The materials included cast acrylic, cellulose acetate, allyl resin, vinyl copolymer and cast phenolic. Data on light transmission, dielectric constants and power factors, and flexural strengths after exposure are presented.

AD-262 805 Div. 14, 4
(13 Sep 61) OTS price $1.60

Pennsalt Chemicals Corp., Wyndmoor, Pa.
POLYMERIZATION OF PHOSPHONITRILIC CHLORIDE TRIMER AT HIGH PRESSURES AND TEMPERATURES,
by J. R. Soulen and M. S. Silverman. Aug 61, 20p. incl. illus. tables (Technical rept. no. 25)
(Contract Nonr-268700)
Unclassified report

DESCRIPTORS: Phosphonyl radicals, Chlorides, Nitriles, Polymers, Polymerization, Preparation, Physical properties, Reaction kinetics, Temperature, Pressure, Chemical reactions, *Synthetic rubber, Nitrile rubber, Elastomers, *Phosphonitrile chlorides, Synthesis.

AD-262 909 Div. 14
(12 Sep 61) OTS price $3.60

Forest Products Lab., Madison, Wis.
STUDY OF GROUNDLINE TREATMENTS APPLIED TO FIVE POLE SPECIES,
by Edward Panek, J. Oscar Blew, Jr., and R. H. Baechler. Aug 61, 31p. incl. illus. tables (Rept. no. 2227)
(In cooperation with Wisconsin U., Madison)
Unclassified report

DESCRIPTORS: *Telephone poles, *Wood, Preservation, Effectiveness, *Fungicides, *Fungicidal coatings, Chlorides, Fluorides, Chlorocarbons, Fluorocarbons, Phenols, Climatic factors, Infection, Impregnation, Test methods.

Field tests were made on pressure-treated pole stubs of 5 important pole species at 3 locations, under different climatic conditions, to determine the distribution of preservative after application of 7 supplementary groundline treatments. Maximum concentrations of the groundline preservatives, pentachlorophenol and NaF1, were found within 1 yr after application under dry site conditions, and within 3 mo under somewhat wetter conditions. Two years after groundline treatments by surface applications, the preservatives, pentachlorophenol and/or NaF1, were confined 1/2-inch zone of the pole. (Author)

AD-262 942 Div. 14
(14 Sep 61) OTS price $.75

Quartermaster Research and Engineering Command, Natick, Mass.
SOVIET-BLOC DEVELOPMENT OF SYNTHETIC FIBERS,
by R. C. Laible, L. I. Weiner, and E. Stone. Apr 61, 24p. incl. illus. tables (Textile series rept. no. 117)
Unclassified report

Division 15 - MATHEMATICS

DESCRIPTORS: Fibers, *Synthetic fibers, USSR, Physical properties, Mechanical properties, Plastics, Polymers, Esters, Amides, Acrylonitriles, Metal organic compounds.

Man-made fiber developments in the Soviet bloc are discussed in relation to Western achievments. At least three of the fibers - Enant, a nylon 7; Ftorlon, a fluorine-containing copolymer; and Vinitron, a combination of nitrocellulose with chlorinated polyvinyl chloride - have no counterparts in the United States or Great Britain. Other fibers, such as Nitron, Lavsan, Anid, Steelon, and Khlorin, are so closely related to Orlon, Dacron, nylon 66, nylon 6, and Pe Ce respectively that the degree of originality in their development cannot be ascertained. East German experimental work on hollow fibers and the conjectural Latvian use of 2-methylpiperazine for the preparation of new polyamides show the possible contribution of the satellite countries to the total Soviet effort. The Russian scientific climate is discussed to show the increasing effort in the field of new synthetic fibers that may be expected from Russia in the future. (Author)

AD-263 007 Div. 14
(15 Sep 61) OTS price $1.60

General Electric Co. Cincinnati, Ohio.
HIGH STRENGTH GLASS FIBERS DEVELOPMENT PROGRAM.
Monthly progress rept. no. 1, 15 July-15 Aug 61,
by D. L. Hollinger, H. T. Plant, and T. J. Jordan.
15 Aug 61, 11p. incl. tables.
(Contract NOw 61-0641-c)
Unclassified report

DESCRIPTORS: *Glass textiles, Fibers, Production, Processing, Melting, Controlled atmospheres, Drawing (Machine processing), Lubricants, Coatings, Tensile properties, Mechanical properties, Moisture, Deterioration, Test methods, Reinforcing materials, Filament wound construction, Plastics, Laminates.

Major effort was on the design of the fiber drawing apparatus. Relatively minor amounts of time have been spent on designing the environmental control system, means of applying protective coatings to the virgin fiber, test apparatus for individual fiber tensile strength, and equipment for winding test rings. All of these facilities are being built in order to obtain the process flexibility desired. (Author)

AD-263 031 Div. 14
(15 Sep 61) OTS price $1.10

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.
RESULTS OF QUALIFICATION TESTS ON FIVE MIL-A-5090D ADHESIVES SUBMITTED BY BLOOMINGDALE RUBBER COMPANY,
by I. Rosenfeld and E. K. Rishel. 17 Oct 60,
7p. incl. tables (Rept. no. NAMC AML 1155)
Unclassified report

DESCRIPTORS: *Adhesives, *Rubber adhesives, Deterioration, Aviation fuels, Jet engine fuels, Ice prevention, Fuel additives, Hydraulic oils, Water, Sea water, Temperature, *Bonded joints, Shear stresses, Stresses, Mechanical properties, Military requirements, Tests.

AD-263 059 Div. 14
(27 Sep 61) OTS price $1.50

National Aeronautics and Space Administration, Washington, D. C.
EXPLORATORY ENVIRONMENTAL TESTS OF SEVERAL HEAT SHIELDS,
by George P. Goodman and John Betts, Jr.
Sep 61, 54p. incl. illus. tables (Technical note no. D-897)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note D-897.

DESCRIPTORS: *Shielding, *Structures, Thermal insulation, Insulating materials, Sandwich panels, Sheets, Refractory materials, Graphite, Ceramic fibers, Glass textiles, Heat resistant alloys, Stainless steel, Gold, Tests, *Test facilities, Test methods, Thermal radiation, Heat transfer, Sweat cooling, Ablation, Aerodynamic heating, Pressure, Load distribution, Stresses, Simulation, Supersonics, Ethylenes, Gases, Air, Jets.

Radiant-heater tests were made for a graphite heat shield without insulation and with three types of insulating material, and for a metal multipost heat shield. Ethylene-heated-jet survival tests were made for the basic graphite heat shield, an insulated multipost heat shield, and a stainless-steel-tile heat shield. The basic graphite heat shield also was tested in an acoustic facility. Temperature distributions were measured and a numerical procedure was used to predict the temperature distribution through the metallic multipost heat shield. (Author)

AD-263 098 Div. 14, 4
(15 Sep 61) OTS price $1.10

Frick Chemical Lab., Princeton U., N. J.
MAXIMUM RELAXATION TIMES IN POLYTETRAFLUOROETHYLENE,
by A. V. Tobolsky, D. Katz, and A. Eisenberg.
5 Sep 61, 7p. incl. table (Technical rept. no. RLT-36)
(Contract Nonr-185807)
Unclassified report

DESCRIPTORS: Polymers, *Ethylenes, Fluorides, Physical properties, *Molecular weight, Determination, Test methods, *Relaxation time, Measurement, Viscosity, Elasticity, Density.

A non-absolute method for the determination of the molecular weight of a polymer is described with Teflon used as the example. A clear correlation between the maximum relaxation time at 380 C and the molecular weight based on the measurements of the standard specific gravity is shown by the experimental results. The method is not influenced by the degree of crystallinity or degradation of the polymer.

15. MATHEMATICS

AD-262 349 Div. 15
(1 Sep 61) OTS price $2.60

RIAS, Inc., Baltimore, Md.
ASYMPTOTIC BEHAVIOR OF SOLUTIONS OF ORDINARY

DIFFERENTIAL EQUATIONS NEAR SETS,
by Taro Yoshizawa. 1961, 21p. 13 refs. (Technical rept. no. 61-5)
(Contract AF 49(638)382)
(AFOSR-992) Unclassified report

DESCRIPTORS: *Differential equations, Functions, Perturbation theory.

In this paper we shall discuss the asymptotic stability of a set, and by constructing a Liapunov function, we shall discuss the relationships between the solutions of an unperturbed system and the solutions of a perturbed system. To simplify the considerations, we shall deal with an autonomous system as an unperturbed system. In section II we shall construct a Liapunov function for the asymptotic stability in the large of a set. From this result, we shall obtain a Liapunov function for the asymptotic stability of a set. This will be shown in section III. These results include, as a special case, asymptotic stability in the sense of Liapunov and orbital stability. In section IV and in section V, we shall discuss the behavior of solutions of a perturbed system in which a perturbation term is a combination of the case where it tends to zero as t approaches infinity and the case where it is integrable. (Author)

AD-262 350 Div. 15
(1 Sep 61) OTS price $2.60

RIAS, Inc., Baltimore, Md.
PROLONGATIONS AND GENERALIZED LIAPUNOV FUNCTIONS,
by Peter Seibert. 1961, 26p. incl. illus. 12 refs. (Technical rept. no. 61-7)
(Contract AF 49(638)382)
(AFOSR-1119) Unclassified report

DESCRIPTORS: *Differential equations, Functions, Perturbation theory.

The purpose of this note is to study various types of stability in autonomous systems by means of generalized Liapunov functions in the sense of S. Lefschetz (Bol. soc. Mat. Mexicana (2) 3:25-39, 1958) and prolongations in the sense of T. Ura (Ann. sci. Ecole Norm. Sup. (3) 70:287-360, 1953 and Funkcialaj Ekvacioj 2:143-200, 1959). The concept of prolongation leads to a whole hierarchy of new types of stability, all of which occupy an intermediate place between stability in the sense of Liapunov and asymptotic stability. The most significant among them, called absolute stability, is characterized by the existence of a continuous generalized Liapunov function with a non-positive generalized total derivative. If the latter is strictly negative, we have asymptotic stability. The second part of the report is devoted to stability under permanent perturbations or total stability with small bounded perturbation terms. We characterize total stability as invariance under a certain map which has essential properties in common with Ura's concept of prolongation. In order to study properties of different kinds of stability simultaneously, we define prolongations abstractly and consider their invariant sets, thus obtaining stability theorems as corollaries. (Author)

AD-262 400 Div. 15
(11 Sep 61) OTS price $4.60

Columbia U., New York.
A BAYES TEST OF $p \leq 1/2$ VERSUS $p > 1/2$,
by Sigeiti Moriguti and Herbert Robbins. 5 Sep 61, 45p. incl. illus. tables (Rept. no. CU-29-61-Nonr-26659 (MS))
(Contract Nonr-26633, Proj. NR 042-034 and Nonr-26659, Proj. NR 042-205)
Unclassified report

DESCRIPTORS: *Sequential analysis, Statistical tests, Statistical analysis, *Probability, Statistical distributions.

Consider the following sequential decision problem:--An urn contains white and black balls, the proportion p of black balls being unknown, $0 \leq p \leq 1$. A single ball is to be drawn at random from the urn tomorrow and we must guess its color; if our guess is correct we are to receive a reward of $ A, and if incorrect we are to receive nothing. In order to obtain some information about p we are allowed to draw as many balls as we like from the urn today, one at a time and with replacement, observing the color of each ball drawn, but for each such ball drawn we must pay $ 1. Problem: how many balls should we observe today and what color should we then predict for the ball to be drawn tomorrow. (Author)

AD-262 426 Div. 15
(11 Sep 61) OTS price $1.10

Columbia U., New York.
SOME NUMERICAL RESULTS ON A COMPOUND DECISION PROBLEM,
by Herbert Robbins. 11 Aug 61, 8p. (Rept. no. CU-28-61-Nonr-26659 MS)
(Contract Nonr-26659)
Unclassified report

DESCRIPTORS: *Probability, Groups (Mathematics), *Statistical distributions, Numerical analysis, Sequential analysis, Sequences.

When statistical decision problems of the same formal structure occur in large groups, rather than individually, there is often the possibility of reducing the total risk in the compound problem by using a decision procedure in which the decision in each individual problem is based not only on the random variable associated with that problem but also on the random variables associated with the other problems in the group. A very special case of the general procedure is presented so as to reduce to a minimum the mathematical apparatus required to obtain precise numerical results. The results obtained can be generalized in several directions. For example, two arbitrary simple hypotheses about the probability distribution of a random variable x may be tested. Moreover, the decision on the i(th) parameter value 0 sub i can be made to depend only on x(1), ..., x(1).

AD-262 447 Div. 15
(5 Sep 61) OTS price $2.60

Rutgers U., New Brunswick, N. J.
THE MOMENTS OF A VARIATE RELATED TO THE NON-CENTRAL t,
by D. Hogben, R. S. Pinkham, and M. B. Wilk. Mar 61, 12p. illus. (Technical rept. no. N-4)
(Contract Nonr-40416)
Unclassified report

DESCRIPTORS: *Statistical distributions, Integrals, *Statistical tests, Computers, Programming, Tables, *Series.

Division 15 - MATHEMATICS

AD-262 453 Div. 15, 2
(5 Sep 61) OTS price $3.60

Rensselaer Polytechnic Inst., Troy, N. Y.
COMMENTS ON E. PALM'S PAPER - ON THE TENDENCY TOWARDS HEXAGONAL CELLS IN STEADY CONVECTION,
by L. A. Segel and J. T. Stuart. 18 Aug 61, 27p. illus. (RPI MathRep. no. 47)
(Contract Nonr-59108)
Unclassified report

DESCRIPTORS: *Convection, Theory, Thermal conductivity, Stability, Mathematical analysis, Temperature, Viscosity, Periodic variations, *Perturbation theory, Non-linear differential equations.

This analysis refines the earlier work of Palm (J. Fluid Mech. 8:183-92, 1960) concerning the finite amplitude steady state of cellular convective motion attained when a horizontal layer of fluid becomes unstable as a result of being heated from below. The pair of nonlinear ordinary differential equations to which the problem was reduced by Palm (under certain conditions) are given in a corrected form, and are then analyzed in some detail. Results are that, for the model considered, hexagonal convection cells may be the equilibrium state only if the variation of viscosity with temperature is sufficiently great. Under the same circumstances a two dimensional roll cell is also possible, the initial conditions determining which state actually occurs. The analysis enables conclusions to be drawn concerning the flow direction at the cell centre, and also shows that a disturbance of sufficient magnitude may grow even though the situation is a stable one by linearized theory. Comparison with experiment is discussed. (Author)

AD-262 493 Div. 15, 9, 30
(7 Sep 61) OTS price $1.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
NUMERICAL INTEGRATION OF BOUNDARY VALUE PROBLEMS INVOLVING ORDINARY DIFFERENTIAL EQUATIONS,
by Tadeusz Leser. June 61, 16p. (BRL memo. rept. no. 1355)
(Proj. 503-06-002)
Unclassified report

DESCRIPTORS: *Numerical methods and procedures, *Differential equations, *Digital computers, Fluid mechanics, *Gas flow, *Boundary layer.

An initial value method of numerically solving the boundary value problems for linear and homogeneous ordinary differential equations is considered. The method is illustrated on two examples from the actual Ballistic Research Laboratories problems. (Author)

AD-262 672 Div. 15
(21 Sep 61) OTS price $8.10

Lockheed Aircraft Corp., Sunnyvale, Calif.
DUALITY THEORY OF SWITCHING FUNCTIONS.
Technical rept. on Mathematics,
by Sze-Tsen Hu. July 61, 58p. incl. illus. tables (Rept. no. 6-90-61-17)
Unclassified report

DESCRIPTORS: *Functions, Linear systems, Complex variables, Theory, Tables.

A method is developed for determining which of the regular switching functions are canonical. The method described requires finding: (1) the set of maximal points of a regular function, and (2) the set of minimal points of the complement of the function. The basic method proves that the minimal points of the function complement are equivalent to the maximal points of the dual of the function. Hence, the previous method for finding the maximal points is applicable. The duality theorems are given and proven. (Author)

AD-262 697 Div. 15, 9
(11 Sep 61) OTS price $3.60

Institute of Engineering Research, U. of Calif., Berkeley.
ON A RESTRICTED CLASS OF COUPLED HILL'S EQUATIONS AND SOME APPLICATIONS,
by C. S. Hsu, June 61, 34p. incl. illus. (Series no. 173, Issue no. 2)
(Contract Nonr-22275)
Unclassified report

DESCRIPTORS: *Equations, *Differential equations, *Nonlinear systems, Fluid mechanics, *Ships, *Motion, Stability.

A class of systems of coupled Hill's equations is studied. It is shown that for systems of equations in this class, completely decoupled Hill's equations may be obtained and the stability of the solutions may be studied in a very much simpler manner. Several physically significant problems are treated to demonstrate the nature of the method; included is a study of a simplified system representing nonlinearly coupled heave-pitch motion of a ship. (Author)

AD-262 708 Div. 15
(11 Sep 61) OTS price $2.60

Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park.
ON THE CALCULATION OF ANALYTIC FUNCTIONS OF CYCLIC MATRICES,
by Phillip B. Abraham and George Weiss. July 61, 18p. (Technical note no. BN-253)
(Contract AF 18(600)1315, Proj. 9751)
(AFOSR-1265) Unclassified report

DESCRIPTORS: *Functions, *Matrix algebra, Integral equations, Fourier analysis, Series.

It is the purpose of this paper to discuss a method for the calculation of functions of cyclic matrices, both for those arising from one dimensional problems and those arising from higher dimensional problems. The technique is a generalization of the method in Lowdin, Pauncz, and de Heer (J. Math. Phys. 1:461, 1960) for the calculation of the inverse square root of a cyclic matrix. It is probably the only one of the methods mentioned by Lowdin, Pauncz, and de Heer which permits of a simple generalization to higher dimensions. Furthermore, the results are in such a form that approximate results are easily obtained when the conditions are such that these exist. The evaluation of functions of asymmetric cyclic matrices is also discussed since these present no more difficulty in theory than do symmetric cyclic matrices. (Author)

AD-262 736 Div. 15
(11 Sep 61) OTS price $3.60

Columbia U., New York.
ON THE STRICTLY STATIONARY PROCESS WITH ADDITIVE SPECTRUM,
by Gisiro Maruyama. 30 Aug 61, 31p. (Rept. no. CU-30-61-Nonr-266(59) MS)
(Contract Nonr-26659, Proj. NR 042-205)
Unclassified report

DESCRIPTORS: *Statistical processes, Integral equations, Functional analysis.

Suppose $X(t)$, $-\infty < t < \infty$, is a real-valued weakly stationary process of the second order, i.e., $X(t)$ has the second moment and $\rho(h) = E(X(t+h)X(t)) = \int_0^\infty \cos \lambda h \, dS(\lambda)$, $m = E(X(t))$ are independent of t, then $X(t)$ has the spectral resolution $X(t) = \int_{-\infty}^{\infty} e^{i\lambda t} \, dZ(\lambda) = \int_0^\infty (\cos \lambda t \, d\xi(\lambda) + \sin \lambda t \, d\eta(\lambda))$, with obvious notations. If further $X(t)$ is Gaussian, then $(\xi(\lambda), 0 \le \lambda < \infty)$ and $(\eta(\lambda), 0 \le \lambda < \infty)$ are independent and identically distributed Gaussian processes with independent increments. By $(\xi(\lambda), \eta(\lambda), 0 \le \lambda < \infty)$ is denoted a two-dimensional process with independent increments (additive process). i.e., any number of increments $(\xi(\lambda_{k+1}) - \xi(\lambda_k), \eta(\lambda_{k+1}) - \eta(\lambda_k))$, $1 \le k \le n$, are independent if $0 \le \lambda_1 \le \lambda_2 \cdots \le \lambda_{n+1}$. (Author)

AD-262 757 Div. 15
(13 Sep 61) OTS price $3.60

Boeing Scientific Research Labs., Seattle, Wash.
THE DISTRIBUTION OF HOMOGENEOUS AND NON-HOMOGENEOUS QUADRATIC FUNCTIONS OF NORMAL VARIABLES,
by Harold Ruben. Aug 61, 40p., 11 refs. (Mathematical note no. 244; Document no. D1-82-0126)
(In cooperation with Sheffield U. (Gt. Brit.))
Unclassified report

Also available from the author.

DESCRIPTORS: *Complex variables, *Statistical functions, Statistical analysis, Probability, *Geometry, *Functions, Matrix algebra, Statistical distribution.

The distribution of homogeneous and non-homogeneous quadratic functions of normal variables is presented. In geometrical terms the probability content is evaluated for a fixed ellipsoid of arbitrary size, location and orientation under an underlying multivariate normal distribution.

AD-262 798 Div. 15
(12 Sep 61) OTS price $1.60

Institute of Tech., U. of Minn., Minneapolis.
ON THE INTERIOR REGULARITY OF WEAK SOLUTIONS OF THE NAVIER-STOKES EQUATIONS,
by James Serrin. 1 Aug 61, 19p.
(Contract AF 49(638)262)
(AFOSR-1239) Unclassified report

DESCRIPTORS: *Partial differential equations, Integral equations, Standards.

AD-262 829 Div. 15, 25
(12 Sep 61) OTS price $1.60

Rensselaer Polytechnic Inst., Troy, N. Y.
LIMITED SUPERPOSITION IN PIECEWISE-LINEAR SYSTEMS,
by B. A. Fleishman. 14 July 61, 12p. (RPI MathRep no. 45)
(Contract AF 49(638)514, Proj. 9783)
(AFOSR-1222) Unclassified report

DESCRIPTORS: *Linear systems, *Servomechanisms, Differential equations, Harmonic analysis.

Piecewise-linear systems of the type that arise in relay servomechanisms or problems involving Coulomb friction, which are usually regarded as nonlinear, are shown here to exhibit certain linear behavior. Specifically, for certain sets of input signals (or forcing functions) and associated responses, the responses are linear in the inputs with respect to convex linear combinations; equivalently, the average of a set of inputs has, as its response, the average of the associated responses. The result is illustrated by means of an explicit formula for periodic responses in a second-order on-off control system. (Author)

AD-262 878 Div. 15, 25
(13 Sep 61) OTS price $12.50

Boeing Scientific Research Labs., Seattle, Wash.
VECTOR INTEGRAL EQUATIONS,
by R. A. Gerwin, J. E. Drummond, and B. G. Springer. Aug 61, 180p. (Document no. D1-82-0051)
Unclassified report

Also available from the author.

DESCRIPTORS: *Integral equations, Matrix algebra, *Fourier analysis, *Plasma physics, Electromagnetic fields, *Bessel functions, Real variables, *Theory, Functions, Integration, *Complex variables.

Vector integral equations (simultaneous integral equations) are used in a mathematical analysis of the properties of ionized gases in a plasma affected by electromagnetic fields. Theorems, problems, and proofs are presented.

AD-262 918 Div. 15
(14 Sep 61) OTS price $3.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
MAXIMAL POINTS OF A REGULAR TRUTH FUNCTION.
Technical rept. on Mathematics,
by Sze-Tsen Hu. June 61, 27p. incl. table (Rept. no. 6-90-61-13)
Unclassified report

DESCRIPTORS: *Functions, Linear systems, Complex variables, Algebra.

Every canonical linearly separable truth function is a regular function, but not every regular truth function is linearly separable. The most promising method of determining which of the regular truth functions are linearly separable requires finding their maximal and minimal points. In this report is developed a quick, systematic method of finding the maximal points of any regular truth function in terms of its arithmetic invariants. (Author)

Division 16 - MEDICAL SCIENCES

AD-262 959 Div. 15
(11 Sep 61) OTS price $2.60

Illinois U., Urbana.
ON THE RELATIVE GROWTH OF DIFFERENCES OF PARTITION FUNCTIONS,
by Hwa Suk Hahn. 1961, 22p.
(Contract Nonr-183418, Proj. NR 043-194)
Unclassified report

DESCRIPTORS: *Functions, *Mathematics, *Integrals, Integration, Integral equations.

The relative growth of differences of partition functions with respect to infinite and finite properties is discussed. Assumptions through integration are proposed and theorems and proofs are developed and applied.

AD-262 977 Div. 15
(28 Aug 61) OTS price $2.60

Columbia U., New York.
ON THE DISTRIBUTION OF THE TWO-SAMPLE CRAMER-VON MISES CRITERION,
by T. W. Anderson. Aug 61, 27p. incl. illus. tables (Rept. no. CU-57-61-Nonr-266(33)MS)
(Contracts Nonr-327900 and Nonr-26633)
Unclassified report

DESCRIPTORS: *Statistical tests, *Statistical analysis, Statistical data, *Integrals, Test methods, *Tables, Statistical functions.

The null hypothesis test by statistical analysis is used. Cumulative distribution data are presented based upon the two-sample Cramer-Von Mises criterion. Values of the means and standard derivations from the (Lesbesque-Stieltjes) integral are listed in the appended tables.

AD-263 027 Div. 15
(15 Sep 61) OTS price $1.60

Miami U., Coral Gables, Fla.
PROBABILISTIC METHODS IN MARKOV CHAINS,
by Donald Austin and Herman Meyer. June 61, 15p.
(Rept. no. 27)
(Contract AF 49(638)184)
(AFOSR-1093) Unclassified report

DESCRIPTORS: *Mathematics, *Probability, Functions, Matrix algebra, Equations, Statistical processes.

An investigation of the analytic properties of non-negative matrices is made satisfying the probabilistically motivated functional relations which are weaker than the semi-group condition. The fundamental differentiation theorem for transition functions of a Markov process is proved in the abstract space case. (Author)

AD-263 050 Div. 15, 25
(18 Sep 61) OTS price $4.60

Brown U. Div. of Applied Mathematics, Providence, R. I.
ON THE SOLUTIONS OF THE DIFFERENTIAL EQUATION yvi=xy. II. TABLES,
by T. H. Hughes and W. H. Reid. May 61, 42p.
incl. tables (Technical rept. no. 45)
(Contract Nonr-56207, Proj. NR-062-179)
Unclassified report

DESCRIPTORS: *Mathematics, *Differential equations, *Integral equations, Fourier analysis, Fluids, *Hydrodynamics, *Fluid mechanics, Cylindrical bodies, *Equations, Computers, *Digital computer, *Tables, Programming.

The equation y to the vi power equals xy plays an important role in the asymptotic solution of many problems in the field of hydrodynamic stability. For these applications it is convenient to define a set of six standard solutions, three of which tend to zero for large positive values of x. The solutions so defined are here tabulated, together with their first five derivatives, for x equals -8(0.1)+6. The calculations were made using the power series expansions and by numerical integration. (Author)

AD-263 067 Div. 15
(18 Sep 61) OTS price $10.50

Kansas U., Lawrence.
STUDIES IN EIGENVALUE PROBLEMS. THEORY OF BESSEL POTENTIALS. PART II,
by N. Aronszajn and K. T. Smith. June 61, 124p.
(Technical rept. no. 26)
(Contract Nonr-58304)
Unclassified report

DESCRIPTORS: *Mathematics, Integrals, *Matrix algebra, *Bessel functions, *Theory.

A study in eigenvalue problems based upon the theory of Bessel potentials is presented. Euclidean space functions are investigated by use of Lebesgue and Dirichlet integrals and the Litchenstein and Calderon extension methods. Theorems, proofs and examples of the various methods are given.

16. MEDICAL SCIENCES

AD-262 307 Div. 16, 20
(1 Sep 61) OTS price $2.60

Naval Radiological Defense Lab., San Francisco, Calif.
INCREASED RADIORESISTANCE IN MICE INJECTED WITH URETHANE TWO DAYS BEFORE X-IRRADIATION,
by L. J. Cole and S. R. Gospe. 10 July 61, 22p. incl. illus. tables, 18 refs. (Research and development technical rept. no. NRDL-TR-519)
Unclassified report

DESCRIPTORS: *Urethanes, X-rays, Radiation effects, Sensitivity, Radiation tolerance, *Chemotherapeutic agents, Physiology, Biochemistry.

The possibility of altering radiosensitivity of mice by repeated injections of urethane was investigated. Adult female mice received two intraperitoneal injections of an aqueous solution of urethane (1 mg/g body wt), one day apart. Twenty-four hours after the last injection, the

mice were exposed to a single acute dose of 250 kvp X-rays, in the midlethal or lethal range. The 30-day LD(50) for the urethane-treated mice was found to be 970 r; the LD(100) was 1010 r. The corresponding values for the control irradiated mice were 790 r and 840 r, respectively. The radioprotective effect of urethane was not seen when the drug was administered 30 min before irradiation, nor when the mice were irradiated 7 days after the last urethane injection. The protective effect could not be duplicated by preradiation exposure (1 or 2 days prior) to 100 r, 200 r, or 300 r. Non-irradiated mice given two daily injections of urethane as above exhibited a marked fall within 24 hours, in the total nucleated cell count of femoral marrow and peripheral blood, accompanied by a definite increase in the myeloid/lymphoid cell ratio of the blood. The results suggest that urethane-induced alterations in cell population of bone marrow are accompanied by an increase in the number of relatively radioresistant cell types, involved in myelopoiesis. (Author)

AD-262 399 Div. 16, 25
(5 Sep 61) OTS price $1.10

Air Weather Service, Scott Air Force Base, Ill.
RADIATION EFFECTS ON MANNED SPACE FLIGHTS,
by Herbert S. Appleman. Aug 61, 9p. incl. illus.
(Technical rept. no. 156)
Unclassified report

DESCRIPTORS: *Spaceships, *Space flight, *Manned, *Radiation effects, Cosmic rays, Solar flares, Sunspots, Van Allen radiation belt, Dose rate.

The types of radiation hazards that are of importance in space flight are surveyed, and the origin, probability of occurrence, feasibility of shielding, and prospects for forecasting are discussed. (Author)

AD-262 435 Div. 16
(6 Sep 61) OTS price $4.60

Armed Forces-NRC Committee on Bio-Astronautics, Washington, D. C.
ROTATION DEVICES, OTHER THAN CENTRIFUGES AND MOTION SIMULATORS: THE RATIONALE FOR THEIR SPECIAL CHARACTERISTICS AND USE.
Special rept.,
by Frederick E. Guedry and Ashton Graybiel.
Apr 60, 40p. 93 refs. (Pub. no. 902)
Unclassified report

DESCRIPTORS: *Aviation medicine, *Rotation, *Stress (Physiology), *Flight simulators, *Physiology, Flight, Acceleration tolerance, Acceleration, Space flight, Space environmental conditions, Space medicine, Biophysics.

This report deals with rotation devices used in studying the role of the semicircular canals and otolith organs in aerospace flight. Most of these devices have limited capability as flight simulators but are instrumented for controlling and recording the dynamic performance of the rotary structure and for measuring electrophysiological and behavioral responses of the subjects. The greater number are designed primarily to stimulate the semicircular canals, organs uniquely structured to respond to angular accelerations. The otolith organs, which are stimulated by linear accelerations, respond to change in body (head) position with respect to the direction of gravity or any inertial force of sufficient magnitude. (Author)

AD-262 499 Div. 16
(6 Sep 61) OTS price $1.10

Dental Research Facility, Naval Training Center, Great Lakes, Ill.
PAROTID SECRETION FLOW RATE UNDER DIFFERENT STIMULI,
by Thomas B. Weber. June 61, 7p. incl. tables, 10 refs.
(Proj. MR005. 12-5102)
Unclassified report

DESCRIPTORS: *Salivary glands, Secretion, Production, Stimulation, Measurement, *Saliva.

Different means for evoking parotid secretion were studied. The greatest unilateral flow was elicited when both gustatory and masticatory stimuli such as sweetened chicle with essential oils were used. A maximum flow rate was established with six grams of gum and the optimum flow of 4.2 ml/5 min with 3.00 grams of material. Frequent renewal of the bolus caused a slight increase in secretory rate, but could not maintain a maximal minute by minute volume. A pronounced masticatory response is evident when values of 3.00 gm and over are used and it appears that this mechanism is the principle one for the elaboration of paratid secretion. Gustatory response by both sweet and acid stimulants produced about 1 ml of secretion for each 5 minute interval regardless of the concentration or the times that the solution was renewed. A separate masticatory action and a separate gustatory action roughly approximate the combined masticatory - gustatory response. (Author)

AD-262 541 Div. 16
(6 Sep 61) OTS price $1.60

Kansas U. School of Pharmacy, Lawrence.
THE EFFECT OF CAFFEINE AND NICOTINE AS TENSION-INDUCING AGENTS AND THE ABILITY OF MEPROBAMATE TO COUNTERACT SUCH EFFECTS UPON PERFORMANCE.
Technical rept.,
by Duane G. Wenzel and Paul W. Davis. 1 Sep 61, 12p. incl. table, 22 refs.
(Contract Nonr-58309)
Unclassified report

DESCRIPTORS: *Caffeine, *Alkaloids, Muscles, *Stress (Physiology), Dosage, *Stress (Psychology), Test methods, Tests, Physiology, *Tranquilizing drugs, *Muscle relaxants, Pharmacology, Production.

The effects of nicotine, as four cigarettes prior to testing, caffeine 300 mg., meprobamate 400 mg. and combinations of these one and one-half hours before testing appeared to be quite variable in several performance tests. These tests included: tracking, manual dexterity with pins and collars and screws, Whipple steadiness, nonsense syllables, and arithmetic sums. Although statistical evaluations were not performed, it was likely that nicotine alone induced a performance decrement with the tracking test. Because of the wide variance of individual performances the results of the remaining tests are open to question. There is suggestive evidence, however, to indicate that caffeine and nicotine do induce increased tension, but that some individuals and some tests may be improved rather than deteriorated by this tension. (Author)

Division 16 - MEDICAL SCIENCES

AD-262 583 Div. 16
(6 Sep 61) OTS price $1.60

School of Aerospace Medicine, Brooks Air Force Base, Tex.
CAT SCRATCH DISEASE: RESULTS OF COMPLEMENT-FIXATION AND SKIN TESTS,
by S. S. Kalter. July 61, 9p. incl. tables, 13 refs. (Rept. no. 61-89)
Unclassified report

DESCRIPTORS: *Diseases, *Skin, Tests, Man, Antigens, Etiology, Serum.

Serologic and skin-testing data on a group of patients having cat scratch disease are presented to demonstrate a possible relationship to the psitt-LGV group of viruses. In addition, the results of skin-testing patients with different batches of skin-test antigen are given. The data obtained indicate that the incidence of positive serologic reactions with the psitt-LGV group antigen is consistently higher in patients with cat scratch disease than in individuals of the control group. However, the percentage of positive reactions is not what would be expected from any direct etiologic casual relationship. The response of groups of individuals of different preparations of skin-testing antigen was so variable as to suggest that either more than one agent may be involved or marked strain variations must occur among the agents producing this clinical syndrome. In a small series of LGV patients, 2 of 5 did not respond with positive skin reactions when tested with cat scratch antigen, and at least 2 of the remaining 3 responded in a manner difficult to interpret. (Author)

AD-262 635 Div. 16
(8 Sep 61) OTS price $1.10

Aerospace Medical Lab., Wright Air Development Div., Wright-Patterson Air Force Base, Ohio.
A TRANSISTORIZED HIGH QUALITY CARRIER AMPLIFIER FOR ELECTROCARDIOGRAM.
Rept. for July 59-Jan 60 on Biophysics of Flight,
by Adolf R. Marko. Mar 61, 7p. incl. illus. table (Proj. 7222)
(WADD TN 61-55) Unclassified report

DESCRIPTORS: *Electrocardiography, Electrical equipment, *Transistor amplifiers, Miniature electrical equipment, Design, Circuits, Cathode ray tubes.

A miniaturized electrocardiogram transistor amplifier employing a high efficiency, low level modulator circuit has been developed. This amplifier combines the advantages of a carrier system with the low noise level and high input impedance of a resistor-capacitance coupled straight amplifier. Circuit diagrams and operating characteristics are included. (Author)

AD-262 722 Div. 16, 29
(11 Sep 61) OTS price $2.60

Quartermaster Research and Engineering Command, Natick, Mass.
TEMPORARY HEARING LOSSES FOR PROTECTED AND UNPROTECTED EARS AS A FUNCTIOR OF EXPOSURE TIME TO CONTINUOUS AND IMPULSE NOISE,
by Alexander Cohen. June 61, 22p. incl. illus. tables, 16 refs. (Technical rept. no. EP-151)
Unclassified report

DESCRIPTORS: *Combat noise, *Ear, *Injuries, *Hearing, Helmets, Auditory thresholds.

Temporary hearing losses for frequencies 250 to 8000 cps were noted for bare and protected ears (CVC helmet) after 6-, 12-, and 18-minute exposures to impulse noise (recorded 30-cal. machine gun fire) and continuous wideband noise of comparable energy. Threshold losses for both types of noise were generally confined to frequencies above 1000 cps and tended to become greater with increasing exposure time. Continuous noise caused greater hearing losses than the impulse noise under bare ear conditions for the three exposure times. A comparison of these losses against those noted when using the helmet indicated that the helmet gave significant protection against continuous noise but little protection against impulse noise. A second experiment studied the recovery of 4000 cps threshold losses for a 20-min period after exposure to the noise conditions cited above. Especially for the longer exposure times (12 and 18 min), threshold recovery from bare ear exposures to continuous noise was slower than that noted for impulse noise. As compared with the bare ears, wearing the helmet provided faster rates of recovery from losses due to continuous noise exposures but did not facilitate recovery from losses due to impulse noise. (Author)

AD-262 765 Div. 16
(12 Sep 61) OTS price $2.60

Florida U. Coll. of Agriculture, Gainesville.
THE BIOCHEMISTRY AND PHYSIOLOGY OF NITRIFYING BACTERIA.
Final rept. 1 July 60-1 Sep 61,
by Warren S. Silver. 1 Sep 61, 26p. incl. illus.
(Grant Nonr-G-0006-60)
Unclassified report

DESCRIPTORS: *Bacteria, Biochemistry, Metabolism, *Oxidation, *Nitrites, Oxygen consumption, Physiology, *Pseudomonas, Reaction kinetics, Cytochromes, Soils, Measurement.

The path of C1402 and HC1400H metabolism by Nitrobacter was investigated. The culture isolated in this laboratory became contaminated and all efforts to effect a purification failed. Not only was it impossible to obtain a pure culture from other laboratories but the question as to whether there are any pure cultures of this organism, despite claims to the contrary, remains open. An assay of nitrite oxidation by a rapid recording platinum microelectrode device was made. In impure culture it was found that the addition of nitrite to washed cell suspensions caused a rapid increase in oxygen uptake within the resolution time of the instrument (1 sec.). The method, coupled with P32 incorporation, would be invaluable for studies of oxidative phosphorylation if cultures of high purity were available. A study of a chemical reaction between ferrocytochrome c and nitrite was made. A model system of the reaction of nitrite with cellular constituents in heterotrophic microorganisms is described. The reaction was apparent first order at low nitrite concentrations, but seemed to be second order at 50 micrometers NO2- The experiments planned to detect NO by ESR methods should prove invaluable in clarifying the nature of the intermediate products of this model system. (Author)

AD-262 780 Div. 16
(12 Sep 61) OTS price $5.60

Kansas U., Lawrence.
STUDIES ON THE PROPERTIES OF FIBRINOGEN-FREE LOW GLOBULIN PLASMA PROTEIN SOLUTIONS.
Final progress rept., 30 Apr 54-31 Aug 61,
by Dwight J. Mulford. 31 Aug 61, 53p. incl. tables, 20 refs.
(Contract DA 49-007-md-614)
Unclassified report

DESCRIPTORS: Solutions, *Blood proteins, Fractionation, Separation, Blood plasma, Heat, Stability, *Fibrinogen, Ethanols.

Cold ethanol water mixtures have been used to partially fractionate human plasma for the preparation of heat stable plasma protein solution. Ethanol concentrations ranging from 11 to 40% for the separation of the crude gamma globulin fraction have led to plasma protein mixtures in the supernatant fluid of varying electrophoretic concentrations of albumin; the higher the ethanol concentration, the higher the purity of albumin. When the dry powder was reconstituted to 5% protein with a mixture of 0.004M acetyl-DL-tryptophanate and 0.004M caprylate in water and heated for ten hours at 60 C., the albumin and beta globulins appeared to decrease and the alpha globulin to increase. In the ultracentrifuge all heated preparations contained a small amount of fast moving component. The ratio of the area of the main component of the heated solutions to that of the unheated was on the average 0.98. The amount of fast moving component in Fraction IV-1+IV-4+V decreased with increased ethanol concentration for Fraction II+III separation. An alpha-globulin normally precipitated in Fraction IV-4 of Cohn has been found to be the protein responsible for the fast moving ultracentrifuge component following 10 hours heating at 60 C. (Author)

AD-262 811 Div. 16, 20, 29
(12 Sep 61) OTS price $1.60

Oregon State Coll. Agricultural Experiment Station, Corvallis.
THE GROWTH, BREEDING, LONGEVITY AND HISTOPATHOLOGY OF RATS FED IRRADIATED OR CONTROL FOODS.
Summary rept. on Room Temperature Stored Irradiated Flour Statistical Analysis of Carrot Experiment,
by Ian J. Tinsley, Joseph S. Butts and others.
15 Mar 61, 19p. incl. illus. tables.
(Contract DA 49-007-md-580)
Unclassified report

DESCRIPTORS: *Food, *Radiation effects, Flour, Laboratory animals, Growth, Hematology, Diet, Carrots, Pathology, Life expectancy, Reproduction, Body weight, Blood, Analysis, Blood counts.

Rations containing 35% control or irradiated (37,200 and 74,400 rad) flour have been fed to four generations of rats. Statistical analysis of the data revealed no treatment effects with respect to growth, breeding or longevity. A study of the hematology data also indicated no treatment differences. It was of interest to note that at 98 days the mean weights of animals of the three generations were significantly different. The data from the long-term carrot feeding experiment reported 15 March 1960 has been statistically analyzed and the following effects observed: (1) Fertility. With animals raised on irradiated carrot rations a higher proportion of breedings resulted in litters compared to those fed the unirradiated carrot ration. (2) Ninety-eight and 42 day weights. Animals raised on the unirradiated carrot ration were larger than those on the irradiated carrot rations. In addition, the mean weight of the first generation animals was considerably higher than those of succeeding generations. (3) Gross food intakes and food efficiencies at 42 days. Both the irradiated carrot rations were less efficient than the control carrot ration, the 2.79 megarad ration being the least efficient. (Author)

AD-262 813 Div. 16, 20, 29
(12 Sep 61) OTS price $1.60

Miami U. Coral Gables, Fla. School of Medicine
LONG-TERM DOG AND RAT FEEDING EXPERIMENT EMPLOYING IRRADIATED MILK AND BEEF STEW (C-RATION).
Progress rept. no. 8, 15 Sep 60-15 Mar 61,
by Wm. B. Deichmann. Mar 61. 16p. incl. illus. tables.
(Contract DA-49-007-md-875)
Unclassified report

DESCRIPTORS: *Food, *Radiation effects, Toxicity, Diet, Hematology, Tissues (Biology), Laboratory animals, Fertility, Pathology.

AD-262 814 Div. 16, 20, 29
(12 Sep 61) OTS price $1.60

Miami U., Coral Gables, Fla. School of Medicine.
MOUSE CARCINOGENICITY STUDY.
Progress rept. 1 Mar 57-15 Mar 61,
by Wm. B. Deichmann. Mar 61, 23p. incl. illus. tables.
(Contract DA-49-007-md-789)
Unclassified report

DESCRIPTORS: *Food, *Radiation effects, Laboratory animals, Cancer research, *Tumors, Pathology, Diet, Tissues (Biology).

It is intended that the mixture of irradiated foods will be fed to several different strains of mice for the duration of their life. These mice will be observed grossly and studied histopathologically for the occurrence of tumors. The first four replicates of this experiment have been completed. Tabulation of the tumors present in these mice, as observed grossly, has been made. There is no indication of any significant difference in tumor incidence between the control and experimental groups. (Author)

AD-262 936 Div. 16
(14 Sep 61) OTS price $1.60

Air Crew Equipment Lab., Naval Air Material Center, Philadelphia, Pa.
ENVIRONMENTAL REQUIREMENTS OF SEALED CABINS FOR SPACE AND ORBITAL FLIGHTS. SPACE AGE UTILIZATION OF RECYCLED METABOLIC WASTES,
by Roland A. Bosee, P. R. Tiller and others.
1 Sep 61, 13p. incl. illus. (Rept. no. NAMC-ACEL-459)
(Problem Assignment no. C04AE13-1)
Unclassified report

DESCRIPTORS: *Closed-cycle ecological systems, Space medicine, Space flight, *Metabolic products, *Urine, *Water, Processing, Vacuum apparatus, Purification.

The analysis of daily urine samples from a test

subject revealed normal values in regard to specific gravity and pH. The former determination varied between 1.011 and 1.023; the latter, between 5.0 and 6.0. Qualitative albumin and sugar determinations were negative. Urine color varied from light yellow and clear early in the test period to yellow and cloudy on the last day. Analysis on samples of recovered water revealed excessive acidity on the first three days of the test. The level of pH was maintained at near neutral levels for the remainder of the test. Recycled urine showed no traces of epinephrine and norepinephrine. Daily water intake was maintained, the palatability and odor-free characteristics of the potable water being totally acceptable. The test subject (RAB) suffered no ill effects and the device appears to have good potential for space flight applications. (Author)

AD-262 978 Div. 16, 29
(12 Sep 61) OTS price $1.10

Ohio State U., Research Foundation, Columbus.
THE INFLUENCE OF IRRADIATED FOODS ON THE ENZYME SYSTEMS CONCERNED WITH DIGESTION.
Final rept. 1 Apr 57-30 Apr 61,
by R. O. Moore. 30 Apr 61, 10p. incl. tables.
(Contract DA-49-007-md-787)
Unclassified report

DESCRIPTORS: *Food, *Radiation effects, Preservation, *Digestive system, Physiology, Enzymes, Acceptability, Feeding, Experimental data, Laboratory animals.

The specific aim of the work herein reported was to evaluate the influence of irradiation of foods on their susceptability to digestion and for their influence on the specific enzyme systems concerned in alimentary digestive processes. Since digestion is the first step in the nutritional processing of ingested foods, it was considered that appraisal of the effects (or lack thereof) of irradiation on digestion would allow a statement to be made of the wholesomeness of irradiated foods relative to this physiological parameter. It is the opinion (as derived from the experiments) of the investigator that the digestibility of irradiated foods, at levels of irradiation commensurate with the needs for preservation, will not contribute significantly to the wholesomeness of those foods in the absence of other factors of biological wholesomeness imposed (or not) by irradiation. Although statistically significant variations in digestibility due to irradiation of macronutrients can be demonstrated, it is doubtful whether the gain or loss of digested nutrients would be of biological significance. This statement does not infringe on the possibility that the long-term feeding of irradiated foods might (or not) injure the digestive apparatus to the extent of effecting the wholesomeness of irradiated foods as measured by parameters other then digestibility. (Author)

AD-262 992 Div. 16, 28
(18 Sep 61) OTS price $.50

Aerospace Medical Lab., Wright Air Development Div., Wright-Patterson Air Force Base, Ohio.
PHYSIOLOGIC EFFECTS OF A HYPODYNAMIC ENVIRONMENT SHORT TERM STUDIES.
Rept. for Nov 60-Jan 61 on Biophysics of Flight,
by Duane E. Graveline and George W. Barnard.
Mar 61, 11p. incl. illus. table.
(Proj. 7222)
(WADD TR 61-257) Unclassified report

DESCRIPTORS: *Water, Physiology, Personnel, *Body weight, Motor reactions, Stress (Physiology), *Reaction (Psychology), Simulation, *Weightlessness, Centrifuges, Heat, Heart, Urine, Blood, Anthropometry, Measurement, Psychomotor tests, Analysis.

By a technique involving complete immersion in water, a hypodynamic situation was produced in which normal weight sensations were altered and movement was relatively effortless. Four subjects were evaluated after 6, 12, and 24 hours of this environment. Tilt table, centrifuge, and heat chamber studies demonstrated significant cardiovascular deterioration even after the 6-hour runs, becoming more severe with the 12- and 24-hour experiments. Pertinent psychomotor evaluations, anthropometric measures, and urine and blood studies also were done. The results of this study indicate that the cardiovascular adaptation to a hypodynamic environment of this type occurs early and the deterioration from even a 6-hour exposure is apparent. (Author)

AD-263 009 Div. 16, 4
(15 Sep 61) OTS price $7.60

Gulf Research and Development Co., Pittsburgh, Pa.
DEVELOPMENT OF MICROBIOLOGICAL SLUDGE INHIBITORS.
Rept. for Apr 60-Apr 61 on Aviation Fuels,
by Arthur V. Churchill and William W. Leathen.
June 61, 66p. incl. illus. tables.
(Contract AF 33(616)6989, Proj. 3048)
(ASD TR 61-193) Unclassified report

DESCRIPTORS: *Fuel storage tanks, Jet engine fuels, Contamination, *Microorganisms, Bacteria, Fungi, Coagulation, Detection, Viability, Biosynthesis, Production, *Chemicals, Inhibition, Alkyl radicals, Amino compounds, Acetates, Tests, Experimental data, Borates, Benzyl radicals, Bromides, Acetic acids.

A research investigation was carried out to develop information and materials for control of microbiological sludge formation in jet fuel bulk storage tanks. A total of 184 microorganisms were isolated from jet fuel-water samples; 61% of the isolates survived viability tests. They appeared to fall into eight distinct groups consisting of five fungi (a brown type predominated) and three bacteria (transparent and opaque types predominated). Approximately 178 water-soluble materials were evaluated as potential microbiological sludge inhibitors. Three

compounds are recommended for trial in bulk storage tanks to control microbial growth. These are alkyl quaternary ammonium acetate, ethylidene diacetate and tri-n-butyl borate. Several others satisfactorily controlled microbial growth but contained elements that are potentially deleterious to fuel properties and fuel system materials. No appreciable changes in properties of JP-4 jet fuel were noted in storage tests of 90 days' duration involving jet fuel-mineral salts substrates with added microorganisms. (Author)

AD-263 028 Div. 16
(18 Sep 61) OTS price $2.60

Naval Ordnance Test Station, China Lake, Calif.
A REVIEW OF MUSCULAR ACTIVITY AND ITS ROLE IN CETACEAN PROPULSION,
by Irving Rehman. 4 Aug 61, 26p. incl. illus., 13 refs. (NOTS TP 2720)
(NAVWEPS rept. no. 7753) Unclassified report

DESCRIPTORS: *Muscles, Cetacea, *Motor reactions, Anatomy, Physiology, Biosynthesis, Ecology, Laboratory animals, Exercise, Biochemical tests, Body temperature, Heat production (Biology).

Some pertinent anatomic, physiological, and biochemical aspects of muscular function are reviewed in relation to energy output in mammals and to cetacean propulsion. The power output and efficiency in the performance of tasks such as stair climbing, swimming, and bicycling are discussed as a basis for comparison with cetacean propulsion. (Author)

17. METALLURGY

AD-262 337 Div. 17, 30
(21 Sep 61) OTS price $.50

Watertown Arsenal Labs., Mass.
THIN, TWIN CHARPY SPECIMENS SPACED FOR TESTING SHEET MATERIALS,
by Armando A. Iannelli and F. J. Rizzitano.
July 61, 20p. incl. illus. (Rept. no. WAL TR 406.5/1)

Unclassified report

DESCRIPTORS: *Titanium alloys, *Sheets, Test methods, Impact shock, Thickness, Laminates, Tests, Design, Temperature.

Charpy impact tests on titanium alloy Ti-155A, heat treated to various strength levels, have been carried out for specimens of standard and reduced thicknesses. The thin specimens have been tested by a newly developed technique which permits testing of specimens by simply cementing them together in pairs with spacers between them. The tests reveal (1) a nonlinear relationship between thickness of specimen and Charpy impact values, and (2) the nonlinearity is more prominent at high temperatures, with the thicker specimens absorbing considerably more impact energy. Charpy impact energy-temperature curves for standard, one-half, one-third, one-fourth, one-sixth and one-eighth of standard thicknesses are presented. (Author)

AD-262 407 Div. 17, 1, 12
(5 Sep 61) OTS price $1.50

Defense Metals Information Center, Columbus, Ohio.
DESIGN INFORMATION ON AM-350 STAINLESS STEEL FOR AIRCRAFT AND MISSILES,
by R. J. Favor, O. L. Deel, and W. P. Achbach.
26 July 61, 52p. incl. illus. tables. 22 refs. (DMIC rept. no. 156)
(Contract AF 33(616)7747)

Unclassified report

DESCRIPTORS: *Stainless steel, Airframes, Aircraft, Guided missiles, Design, Mechanical properties, Tensile properties, Heat treatment, Austenite, Martensite, Hardening, Dispersion hardening, Forging, Welding, Machining, Corrosion resistant alloys, Bibliography, Processing, Specifications, Materials, Corrosion.

Tentative room-temperature design-allowable strengths and elevated-temperature design curves for short-time ultimate tensile strength, tensile yield strength, compressive yield strength, ultimate shear strength, bearing ultimate strength, and bearing yield strength are presented. These curves are based on a number of published and unpublished reports and papers. Appended data are summarized in the format recommended for MIL-HDBK-5 (superseding ANC-5), Strength of Metal Aircraft Elements. Summary plots of substantiating data from which design-allowable strengths were derived are also appended. (Author)

AD-262 496 Div. 17, 26
(6 Sep 61) OTS price $.50

Defense Metals Information Center, Columbus, Ohio.
FABRICATING AND MACHINING PRACTICES FOR THE ALL-BETA TITANIUM ALLOY (Ti-13V-11Cr-3Al),
by C. T. Olofson and F. W. Boulger. 3 Aug 61, 7p. incl. tables, 10 refs. (DMIC memo. no. 121)

Unclassified report

DESCRIPTORS: *Titanium alloys, Aluminum alloys, Chromium alloys, Vanadium alloys, Processing, Heat treatment, Cleaning, Mechanical properties, Deformation, Sheets, Metal forming presses, *Machining, Forging, Drawing (Machine processing), Scale.

Contents:
Heat treatment
Descaling
Forming
Spinning
Dimpling
Shear spinning, press forming, hydroforming
Stretch forming
Bending
Machining

AD-262 497 Div. 17
(6 Sep 61) OTS price $.50

Defense Metals Information Center, Columbus, Ohio.
REVIEW OF RECENT DEVELOPMENTS IN THE TECHNOLOGY OF BERYLLIUM,
by Webster Hodge. 18 Aug 61, 3p. (DMIC memo. no. 123)

Unclassified report

DESCRIPTORS: *Beryllium, Processing, Casting, Purification, Zone melting, Heat treatment, Impurities, Surface properties, Mechanical properties, Fracture (Mechanics), Chemical reactions, Oxygen, Carbon dioxides, Metals.

AD-262 553 Div. 17, 25
(6 Sep 61) OTS price $8.10

Metals Processing Lab., Mass. Inst. of Tech., Cambridge.
INVESTIGATION OF THE MECHANICAL PROPERTIES OF ULTRA-PURE TUNGSTEN.
Final rept. 1 Jan 58-30 June 61,
by D. P. Ferriss, R. M. Rose, and J. Wulff.
30 June 61, 1v. incl. illus. tables, 107 refs.
(Contract DA 19-020-ORD-4543)
(AROD rept. nos. 1970:1-50

Unclassified report

DESCRIPTORS: *Tungsten, *Tantalum, *Tungsten alloys, Single crystals, Growth, Zone melting, Electron beams, Low temperature research, Plastic flow, Stresses, Mechanical properties, Lattices, Deformation, Phase transitions, Grains (Metallurgy), Fracture (Mechanics), Hardening, Purification, Degassification, Impurities, Porosity, Tensile properties, Tantalum alloys.

Contents:
Electron-beam zone melting
Yielding and plastic flow in single crystals of tungsten
Deformation of tantalum single crystals
Flow and fracture of high purity tantalum-tungsten alloys in the ductile-brittle transition region
Void formation in tungsten above 2800 C

AD-262 555 Div. 17, 25
(8 Sep 61) OTS price $1.00

Revere, Althea, Vineyard Haven, Mass.
REPLICATION TECHNIQUES FOR ELECTRON MICROSCOPIC STUDIES OF IRON WHISKER SURFACES.
Rept. for July 59-July 60 on Solid State Research and Properties of Metals.
Mar 61, 12p. illus. 21 refs.
(Contract AF 33(616)6604)
(WADD TR 60-287) Unclassified report

DESCRIPTORS: *Iron, Single crystals, Surfaces, Reproduction, Test methods, Polymers, Styrenes, Dioxides, Silicon compounds, Chromium, Electron microscopy, Growth, Surface properties, *Metallic crystals, Molding materials, Molding.

An adaptation of the polystyrene-silica technique has been developed for preparing replicas of the surfaces of iron whiskers. By this technique the original whisker specimen is neither sacrificed nor altered. A number of replicas can be made on the same specimen to permit the replication and study of the whole surface area from the base to the tip of the whisker. Electron micrographs have been taken on replicas of the surfaces of iron whiskers from boats which were prepared by varying the growth conditions. These micrographs show fine details in surface structures which include minute depressions, elevations, and fine parallel grooves and ridges. No interpretation of these structures is made at this time. They will be used in studying growth mechanisms and may facilitate the analysis of the mechanical behavior of iron whiskers at room and elevated temperatures. (Author)

AD-262 589 Div. 17
(6 Sep 61) OTS price $7.60

Titanium Metals Corp. of America, Henderson, Nev.
A STUDY OF AIR CONTAMINATION AND PROTECTION FOR FOUR DOD TITANIUM SHEET ALLOYS.
Final technical engineering rept. July 58-June 61.
June 61, 66p. incl. illus. tables, 10 refs.
(Contract AF 33(600)36830, Proj. 7-672)
(ASD TR 61-7-672) Unclassified report

DESCRIPTORS: *Titanium alloys, Sheets, Processing, Air, *Contamination, Impurities, Inhibition, Manufacturing methods, Heating, Hardness, Penetration, Temperature, Time, Aluminum alloys, Chromium alloys, Molybdenum alloys, Vanadium alloys, Glass, Oxygen, Nitrogen, Argon, Helium, Carbon compounds, Oxides, Salts.

The allowable times and temperatures to be used during the heating of Ti alloys for processing to sheet in order to minimize the extent of surface contamination from O and N were determined. Also determined was the media which may be substituted for air to prevent or minimize surface contamination. Results showed that with respect to relative rates of diffusion (of hardness) Ti-4Al-3Mo-1V and Ti-6Al-4V were approximately the same and showed the most resistance to hardness penetration, followed in order by B-120 VCA and Ti-2.5Al-16V. The same held true for metal loss except Ti-4Al-3Mo-1V had better resistance than Ti-6Al-4V. Of all the alloys, Ti-2.5Al-16V was the least resistant to air contamination. With respect to prevention of contamination, commercial or purified He and Ar were equally effective in preventing contamination. CO and mixtures of CO with He or Ar also showed promise in reducing contamination. An investigation was made of molten salts and glasses as means of protection against contamination. (Author)

AD-262 604 Div. 17
(7 Sep 61) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
METALLO-CERAMIC METHOD OF OBTAINED ALLOYED MOLDINGS ON THE BASIS OF MOLYBDENUM,
by A. V. Savin. 29 June 61, 7p. incl. tables.
(Trans. no. MCL-952 of Izvestiya Akademii Nauk SSSR, OTN, Metallurgiya i Toplivo 6:47-50, 1960)
Unclassified report

DESCRIPTORS: *Molybdenum alloys, *Powder metallurgy, Powder metals, Additives, Titanium alloys, Zirconium alloys, Sintering, Oxidation, Microstructure, Grains (Metallurgy), Impurities, Gases, Oxygen, Nitrogen, Carbon, Translations, Alloys, USSR.

A study was made of the technology of obtaining alloyed molybdenum by the metallo-ceramic method with a minimum amount of gases, especially of O, and a strict limiting of the content of C. The C in the alloys was detected by the volumetric and conductometric methods. The size of the grain of the original powders of Mo was investigated with the microscope and by the method of adsorption of the metal; the content of gas in the powders and in the baked moldings was determined by gas extraction. Carbon (above 0.05%) acts as a deoxidizer in the presence of open pores in the moldings heated to 2100 C in a vacuum of 0.001 mm Hg. More than 0.1 to 0.2% of C, in the alloy, does not lower the amount of O, but leads to the formation of the second phase in the form of filaments between the grains of the solid solution. The degree of decarbonization of the Mo basically depends on the presence of moisture in the H atmosphere, and in the case of the vacuum caking it depends on the content of O in the original powder. (Author)

AD-262 622 Div. 17, 14, 25, 30
(8 Sep 61) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
INVESTIGATING HEAT- AND-ELECTRO-CONDUCTION OF TUNGSTEN AND GRAPHITE AT HIGH TEMPERATURES,
by V. S. Gumenyuk and V. V. Lebedev. 29 June 61, 7p. incl. illus. tables (Trans. no. MCL-1165 of Fizika Metallov i Metallovedeniye 2:29-33, Jan 61)
Unclassified report

DESCRIPTORS: High temperature research, *Thermal conductivity, *Resistance, *Graphite, *Tungsten, Refractory materials, Test equipment, Pyrometers, Test methods, Measurement, Theory, USSR, Translations, *Electrical conductance.

Values of heat conduction coefficients for W and graphite at various temperatures were obtained experimentally and theoretically. The heat conduction coefficients decreased with rise in temperature for both materials between 900 and 2200 C. The specific electric resistance of these substances increased through the range 900-2200 C. The Lorentz number for W between 900 and 2200 C is above the theoretical value and depends approximately upon temperature.

AD-262 710 Div. 17, 25
(11 Sep 61) OTS price $3.60

Materials Research Lab., U. of Calif., Berkeley.
ACTIVATION ENERGIES AND VOLUMES FOR THE PROPAGA-

TION OF LUDER'S BANDS,
by R. L. Nolder, and J. E. Dorn. 21 July 61, 31p. incl. illus. tables, 15 refs. (Technical rept. no. 11; Series no. 103, Issue no. 11)
(Contract Nonr-22249)
Unclassified report

DESCRIPTORS: *Low temperature research, *Aluminum alloys, Magnesium alloys, *Plasticity, *Deformation, Creep, Stresses, Aging, Time, Temperature, Energy, Volume, Atomic structure, Lattices, Sheets.

Activation energies and volumes have been determined for the deformation during the delayed yielding of a dilute aluminum alloy containing magnesium near the temperatures 80 and 130 K. The activation energies during the three stages of yielding have been associated with the intersection mechanism. According to present theories it would have been expected that the first two stages would be thermally dependent on the unlocking of dislocations from Cottrell atmospheres. However, it is expressed by the authors that the activation energy associated with this unlocking is much larger than previously assumed. Therefore, unlocking is essentially due to the stress concentration caused by the pile up of the dislocations which are mobile during the initial stage of the delayed yielding. The interpretation of the activation volumes also firmly support this interpretation. (Author)

AD-262 732 Div. 17
(11 Sep 61) OTS price $1.50

Watervliet Arsenal, N. Y.
PROTECTION OF STEEL AGAINST EROSION, CORROSION, AND WEAR AT ELEVATED TEMPERATURES. PART I,
by F. J. Dashnaw. Nov 60, 58p. incl. illus. table (Technical rept. no. WVT-RR-6012-R)
(Proj. 501-01-033)
Unclassified report

DESCRIPTORS: *Steel, Metal coatings, *Bonding, Diffusion, Adhesion, *Chromium plating, Cobalt, *Nickel plating, Plating, *Electroplating, Chromium, Corrosion resistant alloys, Corrosion, Corrosion inhibition, Heat treatment, Induction heating, Manufacturing methods, Processing, Test methods, Non-destructive testing, Erosion, High temperature research, Guns.

Effort was directed to the development and evaluation of methods for achieving better protection of steel surfaces which are otherwise subjected to erosion, corrosion and wear at elevated temperatures. Single and multi-layer metallic coatings were diffusion bonded to steel and the results evaluated through micrographic examination and a limited number of bend tests. The diffusion bonding was accomplished either through a series of rapid induction heating and quenching cycles or by furnace-annealing. A comparative analysis of the two bonding methods is made. Two nondestructive testing methods used in an attempt to determine relative adhesive strengths are discussed. (Author)

AD-262 815 Div. 17, 26
(12 Sep 61) OTS price $1.10

McDonnell Aircraft Corp., St. Louis, Mo.
MOLYBDENUM STRUCTURAL COMPONENT PROGRAM.
1960, 8p. incl. illus.
(Contract NOw 61-0653-t)
Unclassified report

DESCRIPTORS: *Molybdenum alloys, Titanium alloys, Zirconium alloys, Sheets, Processing, Machining, Manufacturing methods, Quality control, Physical properties, Mechanical properties, Tensile properties, High temperature research, Crystallization, Metal joints, Bolted joints, Riveted joints, Structures, Airframes, Spaceships, Surface properties.

Studies were begun to evaluate the Mo sheet from the Navy sheet rolling program by (1) evaluating the quality of the received sheets; (2) evaluating its fabrication characteristics; (3) designing, fabricating, and testing structural elements from this material; and (4) designing, fabricating, and testing a component of a typical aerospace vehicle. Approximately 950 lb of Mo sheet will be required for this program. (Author)

AD-262 816 Div. 17, 26
(12 Sep 61) OTS price $1.60

Massachusetts Inst. of Tech., Cambridge.
JOINING OF REFRACTORY METALS - TUNGSTEN.
Quarterly rept. for 31 Mar-30 June 61,
by H. Heideklang, P. Kovach and J. Wulff.
30 June 61, 11p.
(Contract DA 19-020-ORD-5236)
(WAL TR no. 460.54/1) Unclassified report

DESCRIPTORS: *Refractory materials, *Tungsten, Brazing, Metal joints, Controlled atmospheres, Hydrogen, Pressure, Heat treatment, *Soldering alloys, Electroplating, Metal films, Nickel, Palladium, *Metallurgical analysis, Mechanical properties, Tensile, properties, Failure (Mechanics), Phase transitions, Crystallization, Porosity, Vaporization, Impurities, Grains (Metallurgy), Diffusion.

Lap joints of commercially pure and 1% thoria doped 0.005-in. W strip were made with N or Pd as filler metals. W composites joined at 1100 C for heat treatment times greater than 10 min in an H atmosphere, at pressures up to 10,000 psi, failed in a brittle manner in a room temperature bend test with the fracture path passing through the joint rather than along it, indicating that the W was successfully joined. Successful joints were accompanied by recrystallization at the joint interface. As heat treatment time was increased, the extent of the recrystallized area extended further into the base metal. Future work will involve tensile tests of butt joints. (Author)

AD-262 947 Div. 17, 31
(14 Sep 61) OTS price $1.60

Committee on Ship Structure, National Research Council, Washington, D. C.
A NAVAL ARCHITECT'S REFLECTIONS ON SOME RESEARCH PROBLEMS WITH SHIP STEEL,
by Georg Vedeler. 4 Aug 61, 16p. incl. illus.
(Serial no. SSC-140)
Unclassified report

DESCRIPTORS: *Steel, Metal plates, Ship decks, Ship hulls, Ship plates, Marine propellers, Fatigue (Mechanics), Fracture (Mechanics), Transition temperature, Deformation, Stresses, Mechanical properties, Test methods, Tests, Impact shock, *Ships, Cargo ships, Tankers, Design, Structures, Construction, Materials.

Contents:
The importance of fatigue in ships
High yield point and cold-working

Discussion of details of impact tests
Is the running of a crack a continuous or a discontinuous process
Importance of defining state of stress for temperature dependent properties of steel

AD-262 987 Div. 17
(15 Sep 61) OTS price $1.60

Armour Research Foundation, Chicago, Ill.
HIGH-TEMPERATURE OXIDATION PROTECTIVE COATINGS FOR VANADIUM-BASE ALLOYS.
Bimonthly rept. no. 1, 12 June-11 Aug 61.
8 Sep 61, 15p.
(Rept. no. ARF 2227-1)
(Contract NOw 61-0806-c)
Unclassified report

DESCRIPTORS: *Coatings, Zinc coatings, Silicon coatings, Vanadium alloys, Oxidation inhibitors, Physical properties, Effectiveness.

A wide range of coating techniques is being investigated for the oxidation protection of vanadium alloys at temperatures above 1800 F. Coatings of Zn, Zn-10w/o Al, Zn-10w/o Sn, and MgNi2 were prepared to explore self-healing properties on V-5w/o Ti-20w/o Cb and V-60w/o Cb. Diffusion-type coatings included the pack-cementation of silicon on V-5w/o Ti-20w/o Cb. After exposure to air for 28 hours at 1800 F and 4 hours at 2000 F, the coatings were intact, but small weight losses indicated the loss of V205. Other approaches currently under study include roll-bonding of Fe-Cr-Al, the liquid-phase sintering of a Cr-Au alloy, and flame-sprayed barium titanate. (Author)

AD-262 994 Div. 17
(15 Sep 61) OTS price $3.60

Ingersoll Kalamazoo Div., Borg-Warner Corp., Mich.
SURFACE DECARBURIZATION PROGRAM.
Quarterly rept. no. 2, 1 Apr-31 July 61,
by L. E. Hershey. 30 Aug 61, 28p. incl. illus. tables.
(Contract NOrd-15719)
Unclassified report

DESCRIPTORS: *Steel, Carbon, *Heat treatment, Surface properties, Hardening, Controlled atmosphere, Processing, Fatigue (Mechanics), Mechanical properties, Tensile properties, Test methods.

Steel forgings were spun and processed into tensile and notch specimens; the Super Tricent material was ordered, received and is being processed for the spinning of specimen blank material; tensile and notched specimens were fabricated from MBMC #1 and AISI 9262 steels; and the base metal tensile tests on AISI 9262 were completed and evaluated. (Author)

18. MILITARY SCIENCES AND OPERATIONS

AD-262 738 Div. 18, 32
(11 Sep 61) OTS price $8.60

Department of the Army, Washington, D. C.
U. S. NATIONAL SECURITY AND THE COMMUNIST CHALLENGE: THE SPECTRUM OF EAST-WEST CONFLICT.
11 Aug 61, 93p. incl. illus. (DA Pam 20-60)
Unclassified report

DESCRIPTORS: *National defense, Political science, *Communism, *Foreign policy, Economics, *Warfare, Armament, Armed forces, USSR, China, Weapons, *Operations research, *Military research.

19. NAVIGATION

AD-262 306 Div. 19
(18 Sep 61) OTS price $.50

National Aeronautics and Space Administration, Washington, D. C.
ROTATIONAL MAGNETODYNAMICS AND STEERING OF SPACE VEHICLES,
by Raymond H. Wilson, Jr. Sep 61, 23p. incl. illus. tables (NASA Technical note no. D-566)
Unclassified report

Paper presented at the Astrodynamics Colloquium of the XIth International Astronautical Congress, Stockholm, Sweden.

Also available from NASA, Wash. 25, D. C., as NASA Technical note D-566.

DESCRIPTORS: *Space navigation, *Magnetic navigation, Magnetic guidance, *Satellite vehicles, Damping, Torque, Rotation.

The stable steering of any vehicle requires that there be applied to it (1) a restoring or directing torque for turning to a required direction, and (2) a damping torque by which all rotations and librations, whether original or caused by the first torque, may be eliminated by immediate dissipation of energy. A damping torque which is predictable and readily available for steering vehicles in outer space is demonstrated by precise studies of the magnetic rotational damping of Vanguard Satellites I and II (1958 Beta 2 and 1959 Alpha 1, respectively). For efficient exploitation of magnetic damping, it is possible to design magnetically retractable fins of such shape and highly permeable material that their effective magnetic permeability may be controlled to yield torques up to millions of times that which would occur without them. Also, a large directable compass needle on the vehicle could provide magnetic restoring torque as a convenient solution to the easier half of the space vehicle steering problem. (Author)

AD-262 324 Div. 19, 30
(31 Aug 61) OTS price $2.60

Naval Postgraduate School, Monterey, Calif.
MINIMUM-TIME SHIP ROUTING BY CALCULUS OF VARIATIONS METHODS.
Master's thesis,
by Harry D. Hamilton. 1961, 17p. incl. illus. table.
Unclassified report

DESCRIPTORS: *Calculus of variations, *Scheduling, *Navigation, Ocean waves, *Digital computers, Ships, *Ocean currents, Oceanography.

The mimimum-time route is determined by calculus of variations, rather than the conventional

manual technique. The method consists of solving the associated Euler equation by numerical integration on the Control Data Corporation model 1604 digital computer. In case 1 the ship's speed is assumed to be primarily a function of position; and in case 2 the ship's speed is taken to be a function of its direction as well as position. Case 2 is recommended for operational adaptation. (Author)

AD-262 459 Div. 19
(5 Sep 61) OTS price $1.60

Woods Hole Oceanographic Institution, Mass.
AN INTERIM LORAN C RECEIVING SYSTEM,
by Robert G. Walden. July 61, 5p. illus. (Reference no. 61-22)
(Contract Nonr-219600)
Unclassified report

Unpublished manuscript.

DESCRIPTORS: *Loran, *Loran equipment, Radio navigation, Navigation, Low frequency, *Radio receivers, Phase measurement, Pulse counters, Shipborne, *Hyperbolic navigation, Signal-to-noise ratio, Position finding, Design, Tests.

Investigations were made to determine whether the Loran C service would be a valuable asset to oceanographic problems. A workable interim system of Loran C reception was provided within a limited operating area. It has the capability of providing an increased accuracy of position determination over existing methods, with certain restrictions imposed by simplification of the analyzing equipment. The model discussed has no provisions for eliminating cycle ambiguity amounting to 10 microsecond increments. It is hoped that this ambiguity can be resolved in future models. Plans are discussed to improve the signal to noise ratio by utilizing more of the pulse train transmitted by the stations. (Author)

AD-262 792 Div. 19, 12, 30
(13 Sep 61) OTS price $.50

National Aeronautics and Space Administration, Washington, D. C.
A DIGITAL SOLAR ASPECT SENSOR,
by James S. Albus. Sep 61, 9p. incl. illus. (NASA technical note no. D-1062)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note no. D-1062.

DESCRIPTORS: *Satellite vehicles, Instrumentation, Optical instruments, *Position finding, Navigation, *Celestial navigation, Navigation computers, Digital systems, Data transmission systems, *Analog-to-digital converters, Coding.

The solar aspect sensor performs the analog-to-digital conversion of data optically. To accomplish this, it uses a binary Gray code light mask to produce a digital indication, in vehicle-fixed coordinates, of the elevation and azimuth angles of incident light from the sun. This digital solar aspect sensor system, in Explorer X, provided measurements of both elevation and azimuth angles + or - 2 degrees at a distance of over 140,000 statute miles. (Author)

AD-262 926 Div. 19, 12
(14 Sep 61) OTS price $10.50

Instrumentation Lab., Mass. Inst. of Tech., Cambridge.
ANALYSIS OF A NONLINEAR DRIVE FOR A GIMBALLED PLATFORM.
Master's thesis,
by Larry D. Roberts. Aug 58, 136p. incl. illus. 17 refs. (Rept. no. T-191)
(Contract AF 04(645)9)
Unclassified report

DESCRIPTORS: *Control systems, Gimbals, Nonlinear systems, Design, Torque, Relays, Power amplifiers, Linear systems, *Guided missiles, *Satellite vehicles, *Inertial guidance, Instrumentation, Differential equations, Theses, Mathematical analysis, Synchros, Gyroscopes, Analog computers.

Studies are made of the control of a single axis gimbal employing a nonsynchronous or synchronous relay type power amplifier. The techniques presented can be readily extended and applied to other systems employing relay type power amplifiers. First, conventional servo design techniques are used to study a linear control scheme so that comparisons can be made with the methods to be presented. For the nonlinear case the analysis utilizes a similar linear compensation approach. Relations for steady state angular error and characteristics of transient responses are given for step inputs. Since the nonlinear systems presented inevitably exhibit limit cycle operation, the describing function method is used to minimize periodic error. One primary objective is to illustrate that a limit cycle in a closed loop control system is not necessarily undesirable. In fact, the analysis demonstrates that the limit cycle behavior can be used to increase the stiffness of the loop, which yields lower steady state angular error and faster responses. An analog computer is used to simulate typical examples to verify developed techniques. The results can be generally interpreted, however, to fit the designer's needs, and demonstrate that the suggested methods are of sufficient accuracy for engineering purposes. (Author)

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-262 331 Div. 20, 25
(30 Sep 61) OTS price $1.10

Ecole Normale Superieure (France).
RANGE OF PROTON-ANTIPROTON ANNIHILATION,
by Maurice Levy. Sep 60, 6p. (Technical note no. 21)
(Contract AF 61(052)173)
(AFOSR-98)
Unclassified report

DESCRIPTORS: *Protons, *Antiprotons, *Annihilation reactions, Hydrogen, Scattering, Elastic scattering, Inelastic scattering, Nuclear physics, Nuclear reactions, Proton reactions, Mesons, Annihilation radiation.

AD-262 389 Div. 20
(5 Sep 61) OTS price $10.50

Texas Nuclear Corp., Austin.
A STUDY OF NEUTRONS AND GAMMA RAYS FROM NEUTRON INDUCED REACTIONS IN SEVERAL ELEMENTS.
App. 2 to Final rept. 1 June-31 Dec 59,
by J. T. Prud'homme, I. L. Morgan, and others.
June 60, 126p. incl. tables, 91 refs.
(Contract AF 29(601)1967)
(ARPA Order no. 6-58, Task 6)
(App. 2 to AFSWC TR 60-30, AD-262 394)
Unclassified report

DESCRIPTORS: *Neutrons, *Gamma rays, *Neutron scattering, *Neutron cross sections, Measurement, Energy, Imelastic scattering, Nuclear reactions, Neutron bombardment, Fast neutrons, *Bibliography, Gamma ray spectra, Tables.

A survey was made of all pertinent cross section data in the current literature concerning the number and energy, as a function of angle, of the neutrons and gamma rays emitted when various elements are bombarded with neutrons of energies of 1 and 14 Mev. These are contained in tables and graphs of the appendix. Cross section results for 14 Mev neutrons are included for 46 elements. Also included are the results of an investigation of 1-Mev data for 19 elements. Angular distributions are given for elastically scattered neutrons from 19 elements. References for the 14 Mev survey (Part A) are numbered consecutively starting with Number 1 and are included in a bibliography at the end of Part A. References for the 1 Mev survey (Part B) are also numbered consecutively starting with Number 1 and are given at the end of Part B. (Author)

AD-262 394 Div. 20
(5 Sep 61) OTS price $7.60

Texas Nuclear Corp., Austin.
A STUDY OF NEUTRONS AND GAMMA RAYS FROM NEUTRON INDUCED REACTIONS IN SEVERAL ELEMENTS.
Technical rept. 1 June 59-30 June 60,
by J. T. Prud'homme, I. L. Morgan, and others.
June 60, 67p. incl. illus. tables, 19 refs.
(Contract AF 29(601)1967)
(ARPA Order no. 6-58, Task 6)
(AFSWC TR 60-30) Unclassified report

DESCRIPTORS: *Neutrons, *Gamma rays, *Neutron scattering, Measurement, Energy, Gamma ray spectra, *Neutron cross sections, Inelastic scattering, Nuclear reactions, Neutron bombardment, Bibliography, Fast neutrons.

A literature survey was conducted to determine the angular and energy distribution of neutrons nonelastically scattered from a number of elements and to determine information concerning gamma rays resulting from such events. This survey included all available data for incident neutron energies in the region about 1 Mev and at 15 Mev. Energy distributions of nonelastically scattered neutrons were measured for Be, Co, Mo, Cd, and W at 45 and 90 for 15-Mev incident neutrons, and for B, C, Mg, Al, Si, Mn, Fe, Ni, Cu, Se, and Pb at 90 for 15-Mev incident neutrons. Angular distributions of nonelastically scattered neutrons were measured for Be, Co, Mo, Cd, and W for 15-Mev incident neutrons. The (n, 2n) cross section was measured for N-14, F-19, Cu-63, Cu-65, and Sb-121 from 13.2 to 15.7 Mev. Spectra were taken of gamma rays resulting from nonelastic neutron scattering events in B, C, O, Mg, Al, Si, Fe, Ni, Cu, and Zr for 15 Mev incident neutrons. (Author)

AD-262 440 Div. 20, 25
(5 Sep 61) OTS price $1.60

Naval Research Lab., Washington, D. C.
ELECTRONIC EQUILIBRIUM IN FREE-AIR CHAMBERS AND A PROPOSED NEW CHAMBER DESIGN,
by F. H. Attix. 3 Aug 61, 16p. incl. illus.
15 refs. (NRL rept. no. 5646)
Unclassified report

DESCRIPTORS: *Gamma rays, *X rays, *Ionization chambers, *Dosimeters, Dose rate, Design, Ionization, Ionization potentials.

A new type of free-air ionization chamber is proposed in which electric-field uniformity plays no role in defining the ion-collecting volume. The chamber is based essentially upon a subtraction method in which two readings are taken of the ionization and the difference is used as a measure of exposure dose. The chamber is collapsible, its midplane being fixed with respect to the x-ray source. The ionization in the two equal air volumes on either side of the midplane of the chamber when in a collapsed condition and the ionization of the two volumes defined by the chamber in an expanded condition are related in such a way that their difference is just the ionization in the extra volume of air created in the middle of the chamber by the expansion of the chamber. It is evident that the end planes of this extra volume of air are not defined by electrostatic lines of force, as is the case for conventional chambers. Consequently, the new chamber has no need for guard plates or other field-shaping electrodes which are typical of conventional free-air chambers. Since the uncertainty about the degree of field uniformity represents the largest single source of error in conventional chambers, its elimination is a considerable advantage. (Author)

AD-262 444 Div. 20, 4
(5 Sep 61) OTS price $2.60

Naval Radiological Defense Lab., San Francisco, Calif.
RADIOCHEMICAL DETERMINATION OF SODIUM-24 AND SULFUR-35 IN SEAWATER,
by D. Love and D. Sam. 10 July 61, 24p. incl. illus. tables, 19 refs. (NRDL-TR-522)
Unclassified report

DESCRIPTORS: *Sodium, *Sulfur, Determination, *Sea water, *Radiochemistry, Chemical analysis, Radioactive isotopes, Test methods, Design, *Radioactive fall-out, Separation, Scintillation counters, Isotope separation, *Radioactivation analysis, Nuclear explosions, Underwater explosions.

Rapid radiochemical procedures were developed for determining Na-24 and S-35 in seawater containing fission product radionuclides. Na-24 is separated from other radionuclides by scavenging with lanthanum hydroxide; two NaCe precipitations with HCl gas follow. The disintegration rate is determined by measuring the area of the 1.368 Mev gamma photopeak. The working time required for a single analysis is 1/2 hr; the precision, ±1%; the chemical yield, about 70%; and the total effective decontamination factor from fission products greater than 100,000. S-35 in seawater is separated from other radionuclides through precipitating $BaSO_4$. This is followed by reducing the sulfate to H_2S with HI and by subsequently oxidizing sulfide to sulfate in an alkaline peroxide solution. The resulting sulfate ion is precipitated as $BaSO_4$ for chemical yield determination

and counting. The working time required for a single analysis is less than 1 hr; the precision, ±5%; the chemical yield, 70-80%; and the decontamination factor from fission products, greater than 10 to the 7th power. (Author)

AD-262 584 Div. 20, 32
(6 Sep 61) OTS price $2.60

Radiation Effects Information Center, Columbus, Ohio.
MONTHLY ACCESSION LIST 49.
Rept. for 1-31 July 61.
15 Aug 61, 16p. 48 refs. (REIC memo. no. 49)
(Contract AF 33(616)7375, Proj. 1448)
Unclassified report

DESCRIPTORS: *Bibliography, *Radiation effects, Nuclear explosions, Detection, Electronic equipment, Electronic systems, Electrical equipment, Polymers, Metals, Ceramic materials, Dosimeters, Space environmental conditions.

AD-262 602 Div. 20, 25, 4
(7 Sep 61) OTS price $2.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
STUDY OF THE DOSE RATE FIELD OF A CYLINDER EMITTER WITH A HIGH-POWER SOURCE OF Co-60 GAMMA-RADIATION,
by A. Kh. Breger, M. A. Dembrovskiy, and others.
3 Aug 61, 28p. incl. illus. 36 refs. (Trans. no. MCL-897 of Fiziko-Khimicheskiy Institut, Problemy Fizicheskoy Khimii Moscow 2:132-145, 1959)
Unclassified report

DESCRIPTORS: *Radiochemistry, *Dose rate, *Cobalt, Isotopes, Radioactive isotopes, Gamma rays, Radioactive waste, USSR, Technological intelligence, Labeled substances, *Gamma emission, Cylindrical bodies.

AD-262 643 Div. 20
(8 Sep 61) OTS price $4.60

Dayton U. Research Inst., Ohio.
SIMPLIFIED METHOD FOR PREDICTING THERMAL RADIATION IN THE VICINITY OF NUCLEAR DETONATIONS,
by Paul L. Vergamini. May 61, 34p. incl. illus. table.
(Contract AF 33(616)7017, Proj. 1452)
(ASD TR 61-60) Unclassified report

DESCRIPTORS: *Thermal radiation, *Nuclear explosions, Determination, Aircraft, Mathematical analysis, Nuclear weapons, Evasion, Flight paths, Blast, Climatic factors, Atomic bomb explosions.

Simplified, empirical equations are presented which allow determination of the incident thermal radiation on a receiver in the vicinity of a nuclear detonation. The equations are essentially curve fits to the thermal energy values calculated by the Chapman and Seavey prediction technique for both ground and air bursts and for a variety of atmospheric and geophysical parameters. The simplified equations correlate very well with the thermal energy data obtained during OPERATION REDWING. The thermal energy equations for the specific type days standardized by the Air Force in their nuclear weapons capabilities studies are included. Sample calculations employing the simplified equations are presented in Appendix A and a summary of the pertinent equations is given in Appendix B. (Author)

AD-262 644 Div. 20
(8 Sep 61) OTS price $1.60

Dayton U. Research Inst., Ohio.
ON THE UNATTENUATED THERMAL RADIATION FROM NEAR SEA LEVEL NUCLEAR EXPLOSIONS,
by J. E. Kester. July 61, 11p. incl. illus. tables.
(Contract AF 33(616)7017, Proj. 1452)
(ASD TN 61-86) Unclassified report

DESCRIPTORS: *Thermal radiation, *Nuclear explosions, Gamma emission, Gamma rays, Nuclear weapons, Mathematical analysis, Atomic bomb explosions, Atomic clouds.

This analysis discusses the unattenuated thermal radiation which comes directly from the fireball onto a receiver oriented perpendicular to the radius vector out to this point. Primary emphasis is placed on the derivation of an equation similar to equation 3 of Ref. 1 (Chapman, R. M. and M. H. Seavey. Preliminary Report on the Attenuation of Thermal Radiation from Atomic or Thermonuclear Weapons. Air Force Cambridge Research Center, Report TN 54-25, Nov 1954. (Secret)) for bursts intermediate to air and ground bursts and which reduces to the correct value at these two extremes. Presented also is a table of theoretical ground burst gamma values which are used for computing the energy reflected off the terrain. (Author)

AD-262 645 Div. 20, 25
(8 Sep 61) OTS price $5.60

Dayton U. Research Inst., Ohio.
REFLECTED ENERGY FROM A POINT SOURCE TO A PLANE RECEIVER, BOTH SOURCE AND RECEIVER LOCATED BETWEEN TWO LAMBERT PLANES,
by Robert A. Schmall. June 61, 46p. incl. illus. tables.
(Contract AF 33(616)7017, Proj. 1452)
(ASD TR 61-282) Unclassified report

DESCRIPTORS: *Thermal radiation, *Aircraft, *Nuclear explosions, Nuclear weapons, Clouds, Sources, Reflection, Albedo, Mathematical analysis.

The thermal energy transferred from a point source to a plane receiver is considered. Both the source and the receiver are located between two parallel Lambert planes; the receiver is parallel to the reflecting planes. The analysis considers the volume between the reflecting plane to be a vacuum, that is, no attenuation of the radiant energy is taken into account. Data are presented for the source located midway between the two reflecting planes. The application and limitation of this analysis to nuclear weapons effects are discussed. (Author)

AD-262 850 Div. 20, 25
(14 Sep 61) OTS price $1.60

Stanford U., Calif.
QUASI-ELASTIC PEAK IN HIGH ENERGY NUCLEON-NU-

CLEON SCATTERING,
by S. D. Drell and K. Hiida. Aug 61, 12p. incl. illus. (Technical note no. 388-43)
(Contract AF 49(638)388, Proj. 9750)
(AFOSR-1218) Unclassified report

DESCRIPTORS: Targets, Nuclei, Scattering, *Nucleons, *Protons, *Elastic scattering, Pions, Atomic spectrum, Spectrographic analysis.

In the scattering of very high-energy protons from the nucleons within target nuclei, it is found that the scattered protons have a distribution of energies. These experiments where performed which show a sharp peak in the energy distribution which corresponds to elastic scattering of the incident protons, and also a broader peak at somewhat lower energy which corresponds to nearly elastic scattering of the incident protons. An explanation of this latter quasi-elastic peak is offered in terms of the diffraction scattering of one of the pions in the cloud of the target nucleon. This diffraction scattering of the pion by the incident nucleon results in a moderate energy loss of the nucleon, so that it emerges in the quasi-elastic peak. (Author)

AD-262 950 Div. 20, 16
(13 Sep 61) OTS price $1.60

School of Aerospace Medicine, Brooks Air Force Base, Tex.
INHIBITORY ACTION OF DITHIOCARBAMATES ON ENZYMES OF ANIMAL TISSUES,
by Kenneth P. DuBois, Ann B. Raymund, and Bernard E. Hietbrink. June 61, 13p. incl. tables (Rept. no. 61-75)
(In cooperation with Chicago U., Ill.)
Unclassified report

DESCRIPTORS: Tissue (Biology), Laboratory animals, *Enzymes, Inhibition, *Radio protective drugs, Carbamates, Carbamic acid, Thio radicals, Biochemistry.

A study of the effects of derivatives of dithiocarbamic acid was conducted in an attempt to obtain information on the biochemical mechanisms responsible for their toxicity and their radioprotective action. The compounds employed for this study were sodium diethyldithiocarbamate, diethylammonium diethyldithiocarbamate, dimethylammonium dimethyldithiocarbamate, and bis(dimethyldithiocarbamyl) disulfide. Attention was focused on the actions of these compounds on the oxidative phase of intermediary carbohydrate metabolism. All of the compounds were effective inhibitors of the tricarboxylic acid cycle of animal tissues in vitro as evidenced by inhibition of oxygen consumption, citrate synthesis, pyruvic dehydrogenase, alpha-ketoglutarate oxidase, and succinic dehydrogenase. The salts of dithiocarbamic acid were effective inhibitors of these enzymatic reactions in vivo but the disulfide, which lacks radioprotective activity, did not inhibit these reactions in the intact animal. The salts of dithiocarbamic acid also rapidly reduced cytochrome c and inhibited tyrosinase activity in vitro. The results of this investigation suggest that the acute mammalian toxicity of the dithiocarbamates is the result of their strong inhibitory action on enzymes that require sulfhydryl groups for activity. (Author)

NUCLEAR PROPULSION - Division 21
ORDNANCE - Division 22

21. NUCLEAR PROPULSION

AD-262 647 Div. 21
(11 Sep 61) OTS price $14.00

Martin Co., Baltimore, Md.
PM-1 AIR-COOLED CONDENSER TEST PERFORMED AT THE CLIMATIC LABORATORY, EGLIN AFB, FLORIDA,
by M. B. Eck and J. F. Holliday. 1961, 203p. incl. illus. tables (Rept. no. MND-M-2575)
(Contract AF 29(601)4301)
Unclassified report

DESCRIPTORS: *Steam condensers, Heat exchangers, Tests, Test equipment, De-icing systems, Air cooled, *Nuclear power plants, Instrumentation, Boilers, Thermocouples, Control systems, Climatic factors, Transportation, Handling.

A single module of the PM-1 four-module condensing system was tested over an ambient temperature range of +70 to -65 degrees F. All modes of normal operation, transportation and handling, as well as some emergency conditions, were imposed on this condenser section. The unit was shown to have an adequate margin of safety in all of its design parameters. The calculated over-all heat transfer coefficient was exceeded by 5.3%. The air side pressure drop was 17.2 percent less than predicted. The total power requirement for the design heat load was, when extrapolated to 6500 ft elevation, 10% less than predicted. It was shown that the total PM-1 plant load can be carried by 3 sections (at sea level) at ambient temperatures below approximately 50 F. The entire condenser can operate well below its minimum flow requirement of 2400 lb/hr at all ambients and it was shown that the air cooler can cover the range of 400 to 750 lb/hr at all ambient temperatures. Modifications were made to the unit during the test to achieve the above performance. These modifications included the addition of flow guides and orifices to the air cooler tube inlets, the addition of air baffles to the main bank and air cooler tubes, a change in the location of the condensate outlet connection and a change to the air cooler water box division plate drain ports. The ability of the unit to be transported aboard a C130A Air Force cargo plane was demonstrated. (Author)

22. ORDNANCE

AD-262 339 Div. 22
(1 Sep 61) OTS price $4.60

Ammunition Group, Picatinny Arsenal, Dover, N. J.
EVALUATION OF THE DEBURRING OF 40MM CARTRIDGE CASES BY THE VAPOR BLAST PROCESS.
Technical rept.,
by Neal J. Friedman and Henry C. Seavey.
July 61, 50p. incl. illus. tables (Technical rept. no. DB-TR:9-61)
Unclassified report

DESCRIPTORS: *Cartridge cases, Vapor pressure, Blast, *Abrasive blasting machines, Quartz, Tests, Production, Processing.

An inherent problem in the production of 40 mm cartridge cases is the presence of burrs in the vent-holes of the powder chamber. A process to

remove these burrs without enlarging the holes or changing the dimensions of the chamber was required. A solution to this burr problem is provided by a recently built machine. The amount of burr removed by vaporblasting depends upon the abrasive used, the duration of blast, percent of abrasive by volume, and the type of burr. Some combinations are more suitable than others, the best appearing to be the use of seven percent 100 Quartz, vapor blast (QVB) abrasive for 30 seconds. (Author)

AD-262 392 Div. 22
(31 Aug 61) OTS price $1.60

Rock Island Arsenal, Ill.
LAUNCHER, ROCKET, BATTLEFIELD ILLUMINATION, XM92.
Notes on development type materiel.
Aug 61, 14p. incl. illus.
Unclassified report

DESCRIPTORS: Rockets, Launching, Illumination, *Rocket launchers, Design, Instruction manuals, Rocket flares, Illuminating projectiles.

AD-262 450 Div. 22, 3
(6 Sep 61) OTS price $6.60

Ammunition Group, Picatinny Arsenal, Dover, N. J.
IMPROVEMENTS IN THE 155 MM CHEMICAL SHELL, M121E1,
by Willis F. Shirk and Warren G. Mirshak.
July 61, 66p. incl. illus. (Technical rept. no. DR-TR: 2-61)
Unclassified report

DESCRIPTORS: *Chemical projectiles, Projectiles, V agents, G agents, Propelling charges, Interior ballistics, Design, Detonation, Safety, Moisture, Artillery, *Chemical warheads.

After two separate premature functionings of the 155mm chemical shell, Picatinny Arsenal began an investigation to determine possible causes. The primary trouble area proved to be the burster charge and the manner in which it was assembled. The burster was redesigned to incorporate the following changes: composition B4 (vacuum melt) instead of 70/30 Tetrytol; burster tube with closed bottom; an attached thickness of felt as cushioning and filler; reduced diametral clearance between burster container and casing. In addition to these improvements in safety, the length of the burster charge was adjusted to permit its use in either the GB or VX shell and with any type of fuze. An O ring was added between fuze adapter and projectile body to keep burster well dry during storage of the round. The projectile with improved burster in steel container performed satisfactorily in tests. (Author)

AD-262 573 Div. 22
(6 Sep 61) OTS price $2.60

Naval Weapons Station, Yorktown, Va.
THE FEASIBILITY OF USING DIFFERENTIAL THERMAL ANALYSIS TO DETERMINE THE THERMAL CHARACTERISTICS OF SELECTED PRIMARY EXPLOSIVES,
by Ernest E. Mason and Dorothy H. Zehmer.
5 June 61, 29p. incl. illus.
(NAVWEPS rept. no. 6997)
Unclassified report

DESCRIPTORS: *Explosives, Lead compounds, Azides, Nitro radicals, Azo radicals, Phenols, Chlorates, Potassium compounds, Decomposition, *Thermochemistry, Chemical reactions, *Gravimetric analysis, Detonation, Stability, Feasibility studies, Electromagnetic waves, Hazards.

A study was made in connection with the Hazards of Electromagnetic Radiation to Ordnance (HERO) program which was concerned with the feasibility of using differential thermal analysis to determine the thermal properties of selected primary explosives. Explosives tested included: dextrinated lead azide, polyvinyl alcohol lead azide, basic and normal lead styphnate, diazodinitrophenol (DDNP), and a mixture of DDNP and potassium chlorate. A thermogram of each explosive, showing that differential thermal analysis is feasible in characterizing the thermal properties of the primary explosives, is offered along with an interpretation of the results. (Author)

AD-262 640 Div. 22, 9
(8 Sep 61) OTS price $4.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
CORRELATED ELECTRICAL AND OPTICAL MEASUREMENTS OF EXPLODING WIRES,
by F. D. Bennett, H. S. Burden, and D. D. Shear.
June 61, 52p. incl. illus. 28 refs. (BRL rept. no. 1133)
(Proj. 503-03-009)
Unclassified report

DESCRIPTORS: High speed cameras, Rotating mirror cameras, *Shock waves, Wire, Copper wire, *Detonation, Tests, Electric currents, Voltage, Measurement, Intensity, Light, *Aerodynamics, Test equipment.

A description is given of a high-resolution streak camera and of an experimental method whereby streak camera records and electrical measurements of exploding wires may be accurately correlated in time. Composite data together with derived values of resistance, power and energy are given for 4 and 5 mil Cu wires at several voltages. These data are compared with the experimental and theoretical results of other workers. From the comparison a coherent model of the exploding wire phenomenon emerges which differs in some details, particularly those having to do with electric arc formation, from models proposed earlier. The transfer of energy from electrical to fluid mechanical form is discussed as are problems having to do with formation of the shock waves. (Author)

AD-262 655 Div. 22
(8 Sep 61) OTS price $1.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
EVALUATION OF NITROCELLULOSE-BASE SPONGE PROPELLANTS PREPARED WITH THE USE OF BLOWING AGENTS,
by Joseph S. Stack, Frank J. Masuelli, and others.
July 61, 19p. incl. illus. tables, 10 refs.
(Technical note no. FRL-TN-83)
(Proj. no. 504.21-007)
Unclassified report

DESCRIPTORS: Additives, Expanded plastics, Plasticizers, Nitrocellulose, Manufacturing methods, Production, Porosity, Porous materials, Propellant grains, Stability, Combustion, Mechanical properties, Benzenes, Amides, Nitroso radicals, Decomposition, *Propellants, Preparation, Tests.

Preparation of sponge propellants by inclusion of a chemical blowing agent in a nitrocellulose-solvent system was investigated. With fibrous

nitrocellulose poor grains were obtained due to the difficulty in removing the solvent. The use of nitrocellulose in the form of ball powder permitted inclusion of all the ingredients and plasticizer in a mold and thorough dispersion of blowing agent in the mix. Results indicated that a wide variety of foam densities could be obtained by different plasticizer systems and concentration of flowing agent. The finished grains were unsatisfactory due to the presence of large voids within the matrix. Closed bomb data indicated no effect of porosity on burning rate. Thermal stability tests were unsatisfactory.

AD-262 714 Div. 22, 9
(11 Sep 61) OTS price $5.60

Naval Ordnance Lab., White Oak, Md.
AN APPROXIMATE SOLUTION OF THE FLOW WITHIN THE REACTION ZONE BEHIND A SPHERICAL DETONATION WAVE IN TNT.
Doctoral thesis,
by L. Rudlin. May 61, 58p. incl. illus. 34 refs.
(NAVWEPS rept. no. 7364)
(DASA rept. no. 1228)

Unclassified report

DESCRIPTORS: *TNT, *Detonation waves, Detonation, Air blast, Spheres, Chemical reactions, Pressure, Density, Shock waves, Shock, Explosives, *Hydrodynamics, Differential equations, Equations of state, Velocity, *Fluid flow, Mathematical analysis, Propagation, *Theses.

The hydrodynamic equations for one-dimensional spherically-symmetric flow are coupled to the chemical reaction kinetics to describe the non-isentropic flow within the reaction zone in the solid explosive TNT. The explosive is considered to be composed of grains which begin to burn when excited by the shock wave heading the detonation and continue to burn throughout the reaction zone. By neglecting certain partial derivatives a set of ordinary differential equations describing the pressure, particle velocity, density, and the shock-front velocity is obtained. Simultaneous solution of these equations, plus certain other algebraic equations, using the IBM-704 computer provides numerical values for the hydrodynamic variables within the reaction zone. These values indicate that although the spherical-detonation-wave values approach the plane-waves as the detonation moves through the spherical charge, the spherical-wave behavior is basically different from the plane-wave behavior. Decay rates are smaller for the spherical detonation; the burning is completed at the Chapman-Jouguet zone only at infinity; and infinite derivatives of the hydrodynamic variables are found at the end of the reaction zone.

AD-262 719 Div. 22
(11 Sep 61) OTS price $2.60

Naval Ordnance Lab., White Oak, Md.
THE RESPONSE OF ELECTRO-EXPLOSIVE DEVICES TO TRANSIENT ELECTRICAL PULSES,
by I. Kabik, L. A. Rosenthal, and A. D. Solem. June 61, 18p. incl. illus. tables (Rept. no. NOLTR 61-20)

Unclassified report

DESCRIPTORS: *Electric detonators, Electric igniters, *Electrical effects, Mathematical analysis, Electromagnetic waves, Wave transmission, Radar equipment, Communication equipment, *Transients, Electric bridges, Direct current, Heating, Temperature, Electric currents, Electromagnetic effects.

A simple mathematical model describing the reaction of electro-explosive devices to electrical stimuli is presented. In comparing the solutions of the mathematical model with actual experimental data for the Mk 1 squib, good agreement has been obtained over a very wide range of input conditions for capacitor discharges, constant-current DC pulses, and 5-megacycle constant-current pulses. The model seems capable of describing the expected response of electro-explosive devices to widely differing wave forms. It makes available a means for accurately predicting response to electrical energy in the region where thermal losses are high. The model has been used to predict the response of the Mk 1 squib to radar and communication equipment. In a radar field the temperature excursions of the squib bridge will depend on the power level, the repetition rate, and the pulse width. For most radars, thermal equilibrium is established rapidly (usually within 20 pulses). (Author)

AD-262 755 Div. 22, 25
(12 Sep 61) OTS price $2.60

Army Armor Board, Fort Knox, Ky.
CHECK TEST OF HEP-T COMPUTER CAM AND TELESCOPE RETICLE FOR M60 TANK.
1 Aug 61, 29p. incl. illus. tables. (Proj. no. 2127-1)

Unclassified report

DESCRIPTORS: *Reticles, Telescopes, Computers, Tanks, *Cams, High explosive ammunition, Fire control computers, Sabot projectiles, Plastic explosives, *Fire control systems.

AD-262 758 Div. 22
(11 Sep 61) OTS price $3.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
UNIFIED THEORY OF LATERAL DEVIATIONS OF UNGUIDED FINNED ROCKETS,
by Serge J. Zaroodny and Tadeusz Leser. May 61, 36p. incl. illus. tables, 11 refs. (BRL rept. no. 1132)
(Proj. no. 503-03-001)

Unclassified report

DESCRIPTORS: *Rocket trajectories, Mathematical analysis, *Rockets, *Exterior ballistics, Fin stabilized ammunition, Theory, Solid rocket propellants, Spin, Combustion, Launching, Rocket flight.

A unified theory of lateral deviations and deflections of unguided solid-propellant rockets is presented. It is based on a model of a non-spinning rocket with the customary simplifying assumptions. The solution is expressed in terms of universal functions which are independent of the properties of any particular rocket, of the initial conditions, and of the choice of units. These functions are well-behaved in the sense of being free from the indeterminacies and small-divisor difficulties of the standard theory of rocketry; the user having access to a computer can easily generate such functions himself. It is shown that the effect of spin can be superposed on the non-spin solution. This research is a by-product of an investigation on self-alignment of rockets, which has been published in the BRL Report 1072 (1959) (AD 219 225). The previously existing theories have been found impractical in this investigation and a more applicable theory had to be derived. (Author)

Division 23-PERSONNEL AND TRAINING

AD-262 898 Div. 22
(14 Sep 61) OTS price $2.60

Institute of Engineering Research, U. of Calif., Berkeley.
THE IMPLOSIVE PHASE OF A SPHERICAL EXPLOSION IN SEA WATER,
by S. A. Berger and M. Holt. June 61, 22p. incl. illus. tables (Series no. 177, Issue no. 1)
(Contract Nonr-22279)
Unclassified report

DESCRIPTORS: *Underwater explosions, Explosion bubbles, *Sea water, Reflection, Shock waves.

The calculation of a spherical explosion in sea water, due to the symmetrical detonation of a charge of PETN, is carried up to the stage when the sound blast wave converges as an implosive wave on the center and is reflected. Continuing earlier calculations by the authors, the complete field of disturbance is determined by the Eulerian Approach, using the method of characteristics and boundary fitting techniques, up to the characteristic ray originating from the center at the time of implosion. At this ray the main shock has traveled approximately 7 charge radii from the center. The implosive phase of the second shock motion is a well-known similarity phenomenon, and a variety of methods for treating this are discussed. (Author)

AD-262 907 Div. 22
(14 Sep 61) OTS price $2.60

Frankford Arsenal, Philadelphia, Pa.
APPLICATION OF FACTORIAL EXPERIMENT AND BOX TECHNIQUE TO BALLISTIC DEVICES,
by D. J. Katsanis and C. L. Fulton. June 61, 23p. incl. illus. tables (Rept. no. R-1592)
(Proj. TS1-15)
Unclassified report

Original contains color plates; All ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: Design, *Catapults, Ejection seats, Rockets, Projectiles, Recoilless rifles, Interior ballistics, Guns, Arming devices, Explosive actuators, *Combinatorial analysis.

In an effort to reduce the time and cost of ballistic experimental development projects, the factorial experiment and Box technique have been applied to ballistic experiments with aircraft seat ejection catapults and rockets, high-low guns, Davis guns, and recoilless rifles. This has resulted in a reduction in the number of rounds fired, with little or no reduction in the validity of the analysis of variance. A detailed discussion of application of the Box technique to the factorial data is presented. This application results in the determination of a zone of suitable performance which makes use of interaction effects to provide greater flexibility in the selection of design parameters. (Author)

AD-262 924 Div. 22
(14 Sep 61) OTS price $1.10

Measurement Systems, Inc., Norwalk, Conn.
QUANTUM DETECTOR FOR MEASUREMENT OF EED BRIDGE WIRE TEMPERATURE RISE.
Monthly progress rept. no. 2, 1-31 Aug 61. 1 Sep 61, 7p. illus. (Rept. no. ER-7023)
(Contract N178-7934)
Unclassified report

DESCRIPTORS: *Electric detonators, *Electric igniters, Safety devices, Monitors, Electric bridges, *Temperature warning systems, *Temperature sensitive elements, Design, *Detectors, Infrared detectors, Miniature electronic equipment, Cooling, Cryogenics, Materials.

Investigations in the following areas have been initiated or completed: (1) to determine the feasibility of using a cryogenically-cooled detector; (2) to determine type of chopper best suited for this application; and (3) to determine type of optical system for collecting energy from the bridge wire and imaging it on the detector. (Author)

AD-263 017 Div. 22
(18 Sep 61) OTS price $2.60

Miller Research Labs., Baltimore, Md.
PRODUCTION ENGINEERING OF PLASTIC COMPONENTS FOR 81 MM T214E2 ILLUMINATING CARTRIDGE.
Progress rept. for July 61,
by E. R. Briggeman. 8 Aug 61, 24p. incl. illus.
(Rept. no. 251-1)
(Contract DA 36-034-ORD-3468)
Unclassified report

DESCRIPTORS: *Cartridges, Guns, *Illuminating projectiles, Pyrotechnics, Production, Materials, Plastics, Smoke generators, Parachutes, Spoilers, Tail fuzes, Costs, Mathematical analysis, Tests, Design.

AD-263 085 Div. 22, 27
(18 Sep 61) OTS price $3.60

Naval Ordnance Test Station, China Lake, Calif.
STUDIES OF A VENTILATED SUPERCAVITATING PROPELLER ON A TORPEDO TEST VEHICLE. PART 1. PERFORMANCE RESULTS,
by Paul C. Roberts. 21 Feb 61, 32p. incl. illus.
(NOTS TP 2633)
(NAVWEPS rept. no. 7628) Unclassified report

DESCRIPTORS: *Torpedoes, Underwater propulsion, Gas turbines, *Marine propellers, Propeller blades, Cavitation, Ventilation, Exhaust gases, Tests, Torque, Thrust, Measurement, Gases, Ejection.

A torpedo test vehicle utilizing a ventilated supercavitating propeller was the subject of an experimental program carried out on the underwater cableway facility at Morris Dam. Vehicle runs, incorporating an 11-in.-diam ventilated supercavitating propeller (DTMB 3819), showed the propulsive efficiency to average 79%. As gas was passed through the blade-ventilation holes in increasing amounts, the advance ratio progressively decreased by 10% but it could not be concluded that the efficiency was directly affected. Propeller performance data obtained with the actual test torpedo agreed with water-tunnel results reported by other laboratories. (Author)

23. PERSONNEL AND TRAINING

AD-262 427 Div. 23, 28
(5 Sep 61) OTS price $8.10

University of Southern Calif., Los Angeles.
AN EXPERIMENTAL STUDY OF FACTORS INFLUENCING

TROUBLE-SHOOTING DIFFICULTY,
by Joseph W. Rigney and Lyle S. Hoffman. June 61 81p. incl. tables (Technical rept. no. 33) (Contract Nonr-22822, Proj. NR 153-093)
Unclassified report

DESCRIPTORS: Behavior, Feedback, *Electronic equipment, Statistical analysis, Theory, Corrections, Experimental data, Reliability, Aptitude tests, Tests, *Training, Training devices, Learning, Maintenance personnel, *Maintenance.

A paper-and-pencil vehicle incorporating principles judged to be of importance in trouble-shooting was developed. Within the framework of a defined symbolic data flow system and the ground rules for trouble-shooting it, subjects were required to locate a defective stage, in each of 20 problems. Three independent variables were set up for experimental test of their effect on solution difficulty. These were (1) the type of diagram used to represent the system (block vs. detailed); (2) the degree of failure of the defective stage (partial vs. complete); and (3) the problem category (feedback vs. nonfeedback). Problem difficulty was defined by the number of persons who located the malfunctioning stage, and by the number of checking errors. Subjects were 132 naval enlisted men selected for electronics school training, who had no formal training in trouble-shooting. It was concluded that the miniature system devised for this study, and its associated vehicle, represent a fruitful method for studying problem-solving variables in a simplified context. Some comments about future research in this general area are presented. (Author)

AD-262 779 Div. 23
(12 Sep 61) OTS price $7.60

New York U., N.Y.
RESPONSE MODE, PACING, AND MOTIVATIONAL EFFECTS IN TEACHING MACHINES,
by Robert E. Silverman and Millicent Alter. 16 June 61, 69p. incl. illus. tables. (Contract N61339-507) (NAVTRADEVCEN 507-3) Unclassified report

DESCRIPTORS: *Teaching machines, Training devices, Theory, Learning, Effectiveness, Test methods, Tests, Test reactions, Personnel, Programming, Naval personnel.

Three experiments were performed to study the effects of response mode; one experiment was done to study pacing and one experiment dealt with the motivational effects of teaching machines. The first three experiments indicated that requiring the student to make an overt response does not facilitate programmed learning, nor is the constructing of a response, whether it be overt or covert, necessarily advantageous. The fourth experiment indicated that pacing will not impair performance if care is taken to insure optimal pacing rates. The fifth experiment gave no evidence of motivational effects in teaching machines: programmed textbooks were as effective as teaching machines. (Author)

AD-262 937 Div. 23, 28
(14 Sep 61) OTS price $5.60

Naval Training Device Center, Port Washington, N. Y.
THE ROLE OF KNOWLEDGE OF RESULTS IN LEARNING: A SURVEY,
by John Annett. 19 May 61, 58p. incl. illus. 12 refs. (Technical rept. no. NAVTRADEVCEN-342-3)
Unclassified report

DESCRIPTORS: *Bibliography, *Education, *Learning, Training, Language, *Reasoning, Stimulation, *Job analysis, Effectiveness, Analysis, Time, Scheduling, Achievement tests, Psychomotor tests, Motor reactions.

This survey attempts to effect a clarification of terminology, critical analysis, and generic overview of studies specifically concerned with knowledge of results and related learning factors. Included within this framework is a summary of the positions of leading theorists, with commentary relating the hypothetical to the applied. This review traces certain classical assumptions (relationship of reinforcement to learning, etc.) and presents divergent experimental evidence. An analysis of the relationship between knowledge of results and motivation, timing, type of information, specificity, and other variables points out the hazard of accepting as established learning doctrine that which may be based upon inadequate or inconclusive evidence. The survey emphasizes the obligation of training specialists to consider possible interaction and biasing effects in the application of traditional approaches to learning under specified conditions. (Author)

AD-263 038 Div. 23
(14 Sep 61) OTS price $1.10

Naval School of Aviation Medicine, Pensacola, Fla.
STUDENT SUGGESTIONS CONCERNING THE FLIGHT AND NAO TRAINING PROGRAMS,
by Rosalie K. Ambler and Alexander A. Longo. 5 June 61, 9p. incl. tables (Special rept. no. 61-3)
Unclassified report

DESCRIPTORS: *Naval personnel, Flight, Students, Training, Attitudes.

The purpose of this study was to compile student complaints and suggestions made about the flight and Naval Aviation Observer (NAO) training programs into a format that would furnish useful information for those concerned with Training Command policy. This report presents a categorization of suggestions or complaints about the training program solicited from 210 students who just recently either completed basic or advanced training or who attrited from the flight or NAO programs. The 153 suggestions made were categorized into five broad areas: Pre-training or Indoctrination, Ground training, Flight training, Personal treatment, and Other. In the opinion of the investigators the following are the more noteworthy findings: (1) The relatively high incidence of students recommending indoctrination hops, (2) The recommendations for pre-flight exemption examinations, (3) The recommendations for changes in the approach to leadership and officer development, and (4) The apparent misunderstanding on the part of some students as to why basic jet students are sometimes put into multi-engine training in advance. (Author)

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

AD-262 910 Div. 24
(14 Sep 61) OTS price $2.60

Link Div., General Precision, Inc., Palo Alto, Calif.
BALLISTIC CAMERA SYNCHRONIZATION AND CONTROL SYSTEM.
Progress rept. no. 4, 1-31 July 61.
15 Aug 61, 17p. incl. illus.
(Contract DA 30-069-ORD-3291)
Unclassified report

DESCRIPTORS: *Ballistic cameras, *Control systems, Design, Timing circuits, Hysteresis, Electric filters, Camera shutters, Pulse generators, *Synchros, *Telescopes, *Optical tracking, Detectors, Oscilloscopes, Tests, Reliability, *Research program administration, Transmit-receive tubes, Automatic, Time delay relays, *Cameras, Transformers, Amplifiers, Errors, Data processing systems, Photographic equipment.

The subsystem schematics are discussed including: G-4 Averaging and Synchronizating Circuit, Coarse Adjust Synchronization System, Fine Adjust Synchronization System, and Hysteresis Motor Filtering System. The minutes of the Design Review Meeting, that was held at White Sands Missile Range, are presented. The Timing Circuit and the Camera Shutter Detector are treated. (Author)

AD-262 931 Div. 24, 6, 12
(13 Sep 61) OTS price $.50

National Aeronautics and Space Administration, Washington, D. C.
PROJECT ECHO. BORESIGHT CAMERAS FOR RECORDING ANTENNA POINTING ACCURACY,
by K. L. Warthan. Sep 61, 8p. incl. illus. tables (NASA Technical note no. D-1138)
(In cooperation with Bell Telephone Labs; Contract NASW-110)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA TN D-1138.

DESCRIPTORS: Satellite vehicles, Tracking, Radar antennas, Ground support equipment, *Optical tracking, *Motion picture cameras, Telephoto lenses, Boresighting, *Photographic recording systems.

Motion picture cameras equipped with telephoto lenses were installed on the transmitting and receiving antennas at Holmdel, New Jersey. When the Echo satellite was visible, a camera obtained a photographic record of the pointing accuracy of the antenna. These data were then used to correlate variations of signal strength with deviations in antenna pointing angle. (Author)

25. PHYSICS

AD-262 300 Div. 25
(1 Sep 61) OTS price $2.60

Institute of Tech., U. of Minn., Minneapolis.
INTERNAL FRICTION AND MODULUS BEHAVIOUR OF GAMMA-IRRADIATED NaCl CRYSTALS,
by J. M. Sivertsen. 17 July 61, 17p. incl. illus. 11 refs. (Technical rept. no. 4)
(Contract Nonr-71029)
Unclassified report

DESCRIPTORS: Sodium compounds, *Chlorides, Shear stresses, Gamma rays, Radiation damage, Measurement, Crystals, Crystal structure, Single crystals, *Internal friction, Lattices, Deformation, Stresses, Vibration, Attenuation, Damping.

The internal friction and modulus of single crystals of NaCl have been measured during the irradiation of the sample by Co-60 gammas. Since the strain amplitude-independent internal friction is at present only explained in terms of the pinned dislocation theory a test of the theory is important. Time dependence of the decrement and modulus as a useful criterion for the validity of the theory was investigated. This follows from the loop length dependence of the decrement and delta E/E. The generation of point defects during gamma irradiation results in the pinning of dislocation loops of the network due to the interaction between the point defects and dislocations. The experimental results of this study seem to indicate that the loop-length dependence predicted by the pinned-dislocation model is the one observed for the modulus defect and decrement. (Author)

AD-262 308 Div. 25, 8
(1 Sep 61) OTS price $1.60

National Bureau of Standards, Boulder, Colo.
LINE WIDTH, g, MAXIMUM ABSORPTION AND PERMITTIVITY OF COMMERCIAL FERRITES AT 3100 AND 9200 Mc,
by Howard E. Bussey. July 61, 14p. incl. illus. tables (NBS rept. no. 6781)
Unclassified report

DESCRIPTORS: Ferrites, *Ferromagnetic materials, Microwave equipment, Spheres, Rods, Tests, *Dielectric properties, Magnetic properties, Magnetic effects, Measurement, Absorption, Magnetic fields, Tensor analysis, Perturbation theory, Test methods, Superhigh frequency, Wave transmission, Microwaves, Waveguides.

By observing ferrimagnetic resonance of ferrite spheres at 3100 and 9200 mc the g factor, line width for sphere resonance, and maximum loss was obtained. Some samples at 3100 mc were not saturated by the applied dc magnetic field during the measurement. Permittivities (dielectric constants) were measured for the available rod samples with 4000 oe applied field at 3100 mc, and 8000 oe at 9200 mc. Previously measured permittivities for the unmagnetized state usually agree closely with the saturated results at 9200 mc, but only sometimes at 3100 mc. (Author)

AD-262 314 Div. 25
(1 Sep 61) OTS price $.75

National Aeronautics and Space Administration, Washington, D. C.
RADIANT HEAT TRANSFER BETWEEN NONGRAY PARALLEL PLATES OF TUNGSTEN,
by J. Robert Branstetter. Aug 61, 22p. incl. illus. tables (NASA Technical note no. D-1088)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note no. D-1088.

DESCRIPTORS: *Heat transfer, *Sheets, Tungsten, Energy, Temperature, Surfaces, Analysis, Data processing systems, Infrared radiation, Surface properties, Errors, *Thermal radiation.

Net radiant heat flow between two infinite, parallel, tungsten plates was computed by summing the monochromatic energy exchange; the results are graphically presented as a function of the temperatures of the two surfaces. In general these fluxes range from approximately 8 to 25 percent greater than the results of gray-body computations based on the same emissivity data. The selection of spectral emissivity data and the computational procedure are discussed. Nongray-body computational techniques for determining radiant heat flux appear practical provided the combination of select spectral emissivity data and the proper mechanized data-reduction equipment are brought to bear on the problem. (Author)

AD-262 351 Div. 25
(1 Sep 61) OTS price $7.60

RCA Victor Co., Ltd. (Canada).
WAVES IN WARM QUIESCENT PLASMAS,
by T. W. Johnston. June 61, 76p. 41 refs.
(Scientific rept. no. 1; Research rept. no. 7-801.12)
(Contract AF 19(604)7246)
(AFCRL-520) Unclassified report

DESCRIPTORS: *Plasma physics, *Wave analysis, Magnetohydrodynamics, Special functions, Matrix algebra, Tensor analysis, Integral equations, Perturbation theory, Mathematical analysis, Magnetic fields, Electron beams, Space charges.

The comparison is made between the analyses of waves in a plasma which use perturbation theory, the Cartesian tensor or spherical harmonic expansion and the integrated velocity moment equations. When the wave phase velocities are much greater than the average particle thermal velocities and when collision frequency is independent of velocity, then to first order in thermal transport terms, the three approaches give the same answer for plane waves, except for the phenomenon of Landau damping. Neglecting such damping and remembering the restriction of phase velocity, the integrated moment equations can then be used to attack non-planar wave problems, such as the interaction of a finite electron beam with a finite plasma. First-order relativistic effects are also considered. (Author)

AD-262 352 Div. 25, 30
(1 Sep 61) OTS price $1.10

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
HIGH SPEED COMPUTER SYSTEM RESEARCH.

Division 25-PHYSICS

Quarterly progress rept. no. 3, 1 Apr-30 June 61,
by E. W. Fletcher and A. L. Loeb. 31 July 61,
7p. incl. table, 10 refs.
(Contract NObsr-77603)
Unclassified report

DESCRIPTORS: *Computers, Digital computers, *Thin films, Metal films, *Vaporization, *Solid state physics, Magnetic fields, *Magneto-optic rotation, Reflection, Light, Ferromagnetism, Crystals, Topology, *Algebra, Ferromagnetic materials.

AD-262 353 Div. 25, 17
(1 Sep 61) OTS price $2.60

Rutgers U., New Brunswick, N. J.
EFFECTS OF PLASTIC DEFORMATION ON SUPERCONDUCTIVE PROPERTIES OF METALS.
Quarterly rept. no. 4, 1 Apr-30 June 61,
by Bernard Serin. 30 June 61, 14p.
(Contract DA 36-039-sc-85187)
Unclassified report

DESCRIPTORS: *Aluminum wire, Plasticity, Deformation, Lattices, *Superconductivity, Transition temperature, Heat treatment, *Resistance, Measurement, Heating, Cooling, Hysteresis, Temperature, Low temperature research, Metals, Aluminum.

Measurements were made of the superconducting transition of the resistance of cold drawn Al wires. The transition on warming was quite broad, whereas on cooling the transition occurred at low temperature and quite suddenly, resulting in a large hysteresis with respect to temperature. This hysteresis disappeared after the specimens were annealed. It is concluded that the strained specimens exhibit all the aspects of supercooling with respect to the temperature at which the superconducting transition occurs. (Author)

AD-262 354 Div. 25, 7
(1 Sep 61) OTS price $2.60

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
MAGNETOHYDRODYNAMICS AND ENERGY CONVERSION.
Technical progress rept. no. 3 for period ending 31 May 61.
15 June 61, 20p. incl. illus. tables.
(Contract AF 33(616)7624)
Unclassified report

Included as section of Quarterly progress rept. no. 62, 15 July 61.

DESCRIPTORS: *Magnetohydrodynamics, Energy, Plasma physics, *Generators, Alternating current, *Electric power production, Gas ionization, Magnetic fields, Shock waves, Reflection, Mathematical analysis.

Research concerns the extension of a one-dimensional analysis of a magnetohydrodynamic ac generator to the slightly lossy case to provide a theoretical basis for determining the possibility of power generation with real gases. The magnetic reflection of a shock-produced plasma is also considered. (Author)

AD-262 362 Div. 25
(1 Sep 61) OTS price $10.50

Technical Operations, Inc., Burlington, Mass.
MONTE CARLO CALCULATIONS ON THE REFLECTION AND TRANSMISSION OF SCATTERED GAMMA RADIATIONS.
Final rept.,
by Dominic J. Raso. July 61, 131p. incl. illus. tables (Rept. no. TO-B 61-39)
(Contract NBy-32190)
Unclassified report

DESCRIPTORS: *Numerical methods and procedures, *Reflection, *Gamma rays, *Compton scattering, *Concrete, Energy, Photons, Wave transmission, Digital computers, Data storage systems, Magnetic tape, Programming, Coding, Probability, Tables, Processing.

Monte Carlo calculations were performed to determine the backscattering and the transmission of gamma rays having energies between 0.02 Mev and 10.0 Mev from concrete. The radiation was assumed to be incident on a semi-infinite medium and on various slab thicknesses of 0.5, 1.0, 2.0, and 4.0 mfp at angles of cos theta sub zero equals 1.0, 0.75, 0.50, 0.25, and 0.10. The case histories of 5000 photons were followed on the IBM 704 digital computer. The information obtained included: (1) The characteristics of emergent photons, which were stored on magnetic tape; (2) A routine that processes these characteristics to give polar and azimuthal angular dose distribution; and (3) Detailed results from the application of the processing routine to the parameters investigated. The computer program, the processing routine, and the results are appended. (Author)

AD-262 374 Div. 25, 9
(1 Sep 61) OTS price $2.60

University of Southern Calif., Engineering Center, Los Angeles.
IONIZED SHOCK FRONT ANALYSIS. PART III. EFFECT OF JOULE HEATING ON ELECTRON DENSITY LEVEL AND MICROWAVE PROPERTIES DOWNSTREAM OF A STRONG SHOCK WAVE.
Progress rept. no. 3 for period ending 31 May 61,
by Melvin Epstein. 31 May 61, 22p. (Rept. no. USCEC 75-3)
(Contract AF 30(602)2159, Proj. 5561)
(RADC TN 61-138, pt. 3) Unclassified report

DESCRIPTORS: *Shock waves, *Gas ionization, Electromagnetic waves, Propagation, Electrical conductance, Analysis, *Heating, *Microwaves, Electrons, *Plasma physics, Magnetohydrodynamics, Propagation, Resistance.

An investigation was carried out of the interaction between a slightly ionized gas downstream of a shock wave and a microwave of sufficient strength to at least slightly alter the electron density level in the gas. The particular type of interaction is that resulting from the Joule heating of the gas. It is assumed that the gas is always in complete equilibrium and so the results may be considered to be valid only in the limiting case of collision frequency large compared to the signal frequency. The calculations indicate that this type of interaction may produce significant increases in electron density level for field strengths as low as one volt/cm under the appropriate conditions. (Author)

AD-262 375 Div. 25, 9
(1 Sep 61) OTS price $2.60

University of Southern Calif., Engineering Center, Los Angeles.
IONIZED SHOCK FRONT ANALYSIS. PART IV. PROPAGATION AND REFLECTION CHARACTERISTICS OF A UNIFORM MEDIUM WITH A NONLINEAR ELECTRICAL CONDUCTIVITY.
Progress rept. no. 4 for period ending 31 May 61, by Melvin Epstein. 31 May 61, 20p. (Rept. no. USCEC 75-4)
(Contract AF 30(602)2159, Proj. 5561)
(RADC TN 61-139, pt. 4) Unclassified report

DESCRIPTORS: *Shock waves, *Gas ionization, *Electromagnetic waves, Propagation, *Electrical conductance, Analysis, Electromagnetic wave reflections, Attenuation, Wave transmission, Plasma physics, Nonlinear systems.

An analysis (AD-252 235) dealing with the effect of a nonlinear electrical conductivity on the propagation of a plane electromagnetic wave through a semi-infinite uniform medium, is reformulated and extended to include the effects of the nonlinear conductivity on the reflecting properties of the interface separating the plasma from free space. Attention was restricted to small degrees of the nonlinearity. The solutions of the equations indicate the following effects of a nonlinear electrical conductivity: the wave number and attenuation factor of the transmitted wave may be significantly increased; the magnitude of the transmission coefficient may be significantly reduced; and the change in phase across the interface, relative to the linear conductivity result may be either positive or negative, depending on whether the signal frequency is greater than or less than the plasma frequency. (Author)

AD-262 388 Div. 25
(31 Aug 61) OTS price $1.10

Bristol U. (Gt. Brit.).
AN INVESTIGATION OF CRYSTAL IMPERFECTIONS BY X-RAY DIFFRACTION.
Status rept. no. 3, 1 Mar-31 May 61, by Andrew R. Lang. June 61, 3p.
(Contract AF 61(052)449)
Unclassified report

DESCRIPTORS: X rays, *Crystals, Crystal structure, *X-ray diffraction analysis, Lattices, Diffraction, Deformation, *Lithium compounds, Fluorides, *Germanium compounds, *Indium compounds, Antimonides.

Experimental work was concentrated on X-ray topographic studies of lithium fluoride, germanium and indium antimonide. Other activities in developments of diffraction theory and experimental techniques, were pursued along the same lines as during the previous period (AD-255 047). Of the experiments those yielding the most immediately interesting results were concerned with dislocation configurations in lithium fluoride. (Author)

AD-262 416 Div. 25
(5 Sep 61) OTS price $1.10

Friedman, Morris D., West Newton, Mass.
ON THE QUESTION OF THE DOPPLER EFFECT IN THE THEORY OF VAVILOV-CHERENKOV LUMINESCENCE, by V. A. Korshunov and G. V. Skrotskii. May 61, 5p. (Trans. no. K-251 from Izv. VUZ, Fiz., 4:56-59, 1960)
(Contract AF 19(604)8496)
(AFCRL-395) Unclassified report

DESCRIPTORS: Technological intelligence, USSR, Translations, Cerenkov radiation, *Luminescence, Mathematical analysis, Electromagnetic fields, Theory.

A geometric interpretation of the Vavilov-Cherenkov phenomenon is analyzed which is convenient for a clarification of the peculiarities of the Doppler effect in this case. (Author)

AD-262 418 Div. 25
(5 Sep 61) OTS price $2.60

Friedman, Morris D., West Newton, Mass.
ON THE CONSERVATION LAW AND EXPRESSION FOR THE ENERGY DENSITY IN THE ELECTRODYNAMICS OF ABSORBING AND DISPERSING MEDIA, by V. L. Ginzburg. June 61, 22p. (Trans. no. G-205 from Izvestiia VUZ, Radiofizika 4:74-89, 1961)
(Contract AF 19(604)8496)
(AFCRL-533) Unclassified report

DESCRIPTORS: Entropy, Technological intelligence, USSR, Translations, Electromagnetic waves, Electromagnetic fields, Absorption, Electrons, *Density, *Energy, Kinetic theory, Plasma physics, Partial differential equations, Integral equations.

The question is discussed of the energy conservation law in electrodynamics and the expression for the energy density in the case of an absorbing dispersing medium. Phenomenological expressions are compared with the results obtained for a plasma when a kinetic equation is used and also a motion equation for a mechanical model with friction. The question of the rate of signal propagation in an absorbing medium is touched upon briefly. (Author)

AD-262 430 Div. 25
(5 Sep 61) OTS price $8.10

Little, Arthur D., Inc., Cambridge, Mass.
STUDY OF NUTATIONAL RESONANCE IN OPTICALLY PUMPED RUBIDIUM VAPOR.
Final rept. 1 Aug 59-31 Aug 61, by Wolfgang Franzen. 21 Aug 61, 76p. incl. illus. (Rept. no. C-62344)
(Contract Nonr-296200, Proj. NR 014-308)
Unclassified report

DESCRIPTORS: *Rubidium, *Vapors, *Pulse modulation, *Electromagnetic fields, Radiofrequency, Quantum mechanics, Hyperfine structure, Light pulses, Optics, Nuclear magnetic dipole moments, Nuclear magnetic resonance.

A method for the optical observation of nutational resonance in optically pumped rubidium vapor has been studied both experimentally and theoretically. The method consists of pulse-modulating an rf magnetic field at one of the Zeeman resonance frequencies of the vapor and observing the resulting damped transient modulation in the transmitted light intensity. Of particular interest is the application of this method to a study of the spin relaxation of

vapor atoms as influenced by the physical parameters of the system, in the case where the applied steady magnetic field is intense enough to cause individual Zeeman intervals to become noticeably unequal. Both single and double quantum resonances at a wide spectrum of Zeeman transitions of Rb-85 vapor diffusing through neon and helium buffer gases have been observed and identified, and the damping of the transient nutations in light intensity has been recorded under a variety of conditions. (Author)

AD-262 441 Div. 25
(5 Sep 61) OTS price $7.60

Naval Ordnance Lab., White Oak, Md.
SOLID STATE RESEARCH OF THE APPLIED PHYSICS DEPARTMENT FOR THE YEAR 1960,
ed. by L. R. Maxwell. 29 May 60, 64p. incl. illus. tables (Rept. no. NOLTR 61-49)
Unclassified report

DESCRIPTORS: *Semiconductors, *Optics, *Intermetallic compounds, Lead compounds, Tellurides, Magnetic alloys, Manganese, Oxides, *Metals, Silicon compounds, Iron, Aluminum, *Rare earth elements, Alloys, Theory, Transport properties, Electron charge, Phonons, Physical properties, Nickel compounds, Fast neutrons, Sapphires, Excitation, Resonance, Ferromagnetism, Microwave amplifiers, Single crystals, Entropy, Measurement, Reflection.

The effort has been concentrated on investigations of the energy bands in semiconductors by optical methods dealing with the lead salt compounds PbS, PbSe, and PbTe, as well as certain intermetallic semiconductors. This work also includes measurements of the reflectivity of intermetallic semiconductors. Investigations of the composition properties of lead telluride have resulted in a better understanding of the phase diagrams of lead telluride. We have continued work on surface effects and transport phenomena, and on the study of recombination lifetimes. The magnetic behavior of rare earth magnetic alloys has been examined. The effect of Zener's double exchange phenomenon has been obtained in certain manganese compounds. We have carried out theoretical work on crystal and magnetic anisotropy and how it relates to the intensity of magnetization and the Curie temperature. The physical properties of materials have been studied, in particular the properties of intermetallic metals, metal oxide whiskers, and the structure of fuzed silica. (Author)

AD-262 442 Div. 25, 12
(5 Sep 61) OTS price $31.60

Naval Ordnance Test Station, China Lake, Calif.
TEMPERATURE TABLES. PART 3. ONE-LAYER CYLINDRICAL SHELL, EXTERNAL HEATING, ONE-SPACE VARIABLE, LINEAR,
by C. J. Thorne and H. C. Morrin. 15 Mar 60, 641p. incl. tables (NOTS TP 2512)
(NAVORD rept. no. 5562, pt. 3)
Unclassified report

DESCRIPTORS: *Cylindrical bodies, *Heat transfer, *Temperature, Tables, Structural shells, Surfaces, Time, *Thermodynamics, Mathematical analysis, Heating.

Temperature tables are calculated for one-layer cylindrical shells with constant outside recovery temperature and constant inside recovery temperature which is equal to the initial temperature in the shell. Temperature is a function of radial distance and time. The rate of heat transfer at both boundaries is assumed proportional to the temperature difference at that boundary. (Author)

AD-262 443 Div. 25, 9
(5 Sep 61) OTS price $5.60

Northeastern U., Boston, Mass.
MAGNETOHYDRODYNAMIC SHOCK WAVES,
by Jack Davis. May 60, 53p. 16 refs.
(Contract AF 49(638)555)
(AFOSR TN 60-1147) Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, *Enthalpy, Thermodynamics, *Entropy, *Shock waves, Propagation, Diffusion, Equations, Theses, Functions, Integrals, Differential equations.

Contents:
The thermodynamics of an infinitely conducting fluid
Fundamental equations
Change in internal energy, enthalpy, and entropy
Specific heats
The acoustic velocity
Variable area isentropic flow
Critical speed and Prandtl's equation
Magnetohydrodynamic shock waves
Jump conditions
Formation of magnetohydrodynamic shock waves
Prandtl's relation
Change in internal energy and enthalpy across a shock front
Hugonoit function
Amplification of the magnetic field
Shock strengths for polytropic gases
Diffusion and plane magnetohydrodynamic shock waves
Basic equations
Shock relations
Diffusion equation
Allowed values of the compression coefficient

AD-262 457 Div. 25
(5 Sep 61) OTS price $4.60

Westinghouse Electric Corp., Pittsburgh, Pa.
ELECTRON SPIN RESONANCE IN SEMICONDUCTING RUTILE,
by P. F. Chester. June 61, 27p. illus. (Scientific rept. no. 11; Scientific paper no. 908C901-P3)
(Contract AF 19(604)5589)
(AFCRL-594) Unclassified report

Presented at the Conference on Semiconducting Compounds, Schenectady, New York, June 14-16, 1961.

DESCRIPTORS: Single crystals, *Semiconductors, *Paramagnetic resonance, Paramagnetic crystals, Titanium compounds, Dioxides, *Nuclear spins, Electrical properties, Impurities, Niobium, Tantalum, Titanium, Lattices, Polarization, Tests, Oxidation, Relaxation time, Reduction, Chemical reactions, Oxidation, Atomic spectrum, Electrons.

The electron spin resonance spectra of a number of samples of single-crystal, oxygen-deficient rutile have been examined in the helium tempera-

ture range. Room temperature resistivities (c axis) ranged from 0.76 to 94 ohm cm. The method of reduction is found to be a determining factor in the nature and temperature dependence of the spectra. The simple spectrum already reported for a 10 ohm cm sample, is found only after reduction in hydrogen followed by partial reoxidation. This spectrum degenerates as the temperature is raised to 12 K to be replaced by a single line which corresponds to the motionally narrowed line observed in lower resistance (0.76 ohm cm) samples. Reduction in vacuum leads to distinctly different spectra with different temperature dependence but with similar g values. Measurements of resistivity vs temperature indicate higher activation energies for vacuum-reduced samples. Possible models for the observed paramagnetic centres are put forward and discussed in relation to the defect structure and electrical properties. The low temperature spectra of niobium- and tantalum-doped rutile indicate that the donor centres in these materials are Nb4 and Ta4 rather than Ti3. (Author)

AD-262 458 Div. 25, 14
(5 Sep 61) OTS price $7.60

Westinghouse Electric Corp., Pittsburgh, Pa.
RESEARCH AND DEVELOPMENT ON HIGH TEMPERATURE FERROELECTRIC MATERIALS.
Summary rept. 23 Dec 58-11 Apr 61,
by E. C. Subbarao, T. Y. Tien and others.
11 Apr 61, 80p. incl. illus. tables, 31 refs.
(Contracts DA 36-034-501-ORD-94, Proj. TN1-2707 and DA 36-034-501-ORD-3202, Proj. TN2-8106)
Unclassified report

DESCRIPTORS: *Ferroelectric materials, *Ferroelectric crystals, Dielectrics, Piezoelectric crystals, *Bismuth compounds, Oxides, Titanium compounds, Lead compounds, Titanates, Niobates, High temperature research, Ceramic materials, Polarization, Crystal structure, Physical properties, Phase transitions, Transition temperature, Dielectric properties, Mechanical properties, Resistance, Measurement, Temperature, Preparation, Single crystals, Lattices, X-ray spectroscopy, Synthesis, Sintering, Impurities, Additives.

An investigation was made to develop a ferroelectric material which possesses the following characteristics in the temperature range from -55 to 500 C: P sub s greater than 4 mu Coulomb/sq cm, d sub 33 greater than 10 to the -10th power Coulomb/Newton, rho greater than 10 to the 7th power Omega-cm and epsilon less than 1500. The work consisted of (1) exploration of new ferroelectric compounds with high Curie temperatures, and (2) optimization of the piezoelectric properties of the more promising ferroelectric materials. Among the new ferroelectrics investigated, the layer-type bismuth compounds, with the general formula Bi2O2(2+)Me sub m-1 R sub m O sub 3m+1(2-) were revealed to constitute the largest family of high temperature ferroelectrics. The development work on the known ferroelectrics resulted in a considerable improvement in the piezoelectric properties of PbTiO3-base materials. (Author)

AD-262 462 Div. 25
(5 Sep 61) OTS price $11.50

Stanford U., Calif.
SOME ASPECTS OF DEFORMATION IN SINGLE CRYSTALS AND BICRYSTALS OF ALUMINUM AT ELEVATED TEMPERATURES,
by Richard H. Bush, Arthur N. Lord, and others.
June 61, 153p. incl. illus. tables, 166 refs.
(Contract AF 18(603)66)
(AFOSR-1073) Unclassified report

DESCRIPTORS: *Single crystals, Metallic crystals, Crystals, *Aluminum, Deformation, Shear stresses, Creep, Grains (Metallurgy), High temperature research, Stresses, Theory, Test facilities, Crystal structure, Mathematical analysis, Lattices.

A study was made to evaluate the kinematics of grain boundary shear and to compare the results pertaining to crystallographic deformation with those reported in the literature. Melt-grown single crystals and bicrystals of high purity Al were tested in tension at extension rates of 8.20 x 10 to the -6th power to 10 to the -4th power cm/sec (strain rates of approximately 2.3 to 230%/hr) and at temperatures of 538 to 650 C. The bicrystal samples contained pure, symmetrical tilt or twist boundaries of 10, 32, 40, 88, and 90 degrees. Continuous stress and total extension and intermittent shear displacement data were obtained as a function of time. A yield point phenomenon which is caused by a small amount of pre-test deformation was observed for single crystals and to a reduced extent for bicrystals. Its presence is explained by a model based upon dislocation multiplication and the stress dependent velocity of dislocations. A yield stress for grain boundary shear which is associated with a thermally activated process was also observed. (Author)

AD-262 480 Div. 25, 8, 12, 5
(6 Sep 61) OTS price $9.60

American Machine and Foundry Co., Alexandria, Va.
ION AND ATOMIC BEAMS IN SPACE.
Final rept.,
by Robert L. Carroll. 14 Aug 61, 108p. incl. illus. tables, 14 refs.
(Contract DA 36-039-sc-78961)
(ARPA Order no. 78-59) Unclassified report

DESCRIPTORS: *Atoms, *Ion beams, Ionization, *Atmosphere, Communication equipment, *Communication systems, *Space weapons, Propulsion, *Particle beams, Ion rockets, *Space flight, Spaceships, Magnetic pinch.

Analysis of the dispersion of a charged ion beam indicates that the limitations imposed by the space charge are quite severe. Beam dispersion due to random thermal velocity distribution is not as severe as that of space charge dispersion. Use of the beam for communications will be of the order of a few thousand miles at most. The effects of Rayleigh, Thompson, and Compton scattering of light by beam particles in the presence of the radiation field of the sun are negligible. The analysis of solar winds and particle clouds in space indicates that the beam particle mean free path is quite large so that there is no significant limitation imposed by their presence. The problem of neutral beam generation is discussed. The possibility of employing the pinch effect upon a beam in the presence of the atmosphere is not feasible. Use of the radiation produced by impact ionization of the atmosphere by means of a beam is impractical on the basis of beam power requirements. Propulsion offers the best possibility for the application of the beam. Deviation and dispersion of the beam in electrostatic and magnetic fields in space are analyzed.

The limitations imposed by these effects are not as great as those already found. The geometrical problems of aiming a beam to strike a target in the fields in space are considered. (Author)

AD-262 521 Div. 25
(6 Sep 61) OTS price $1.60

Friedman, Morris D., West Newton, Mass.
SURFACE WAVES ON THE BOUNDARY OF A PLASMA IN A MAGNETIC FIELD,
by N. A. Gintsburg. July 61, 10p. incl. illus. (Translation no. G-207, of Rasprost. Radiovoln i Ionosf., Trudy, NIZMIRAN USSR 27:208-215, 1960)
(Contract AF 19(604)5969)
(AFCRL-534) Unclassified report

DESCRIPTORS: *Plasma physics, Surface properties, *Magnetic fields, *Ionospheric propagation, Tensor analysis, Wave transmission, Ferrites, USSR, *Radio waves, Propagation, Ferromagnetic materials, Magnetohydrodynamics, Terrestrial magnetism, Ionosphere, Electronic switches, Ionosphere models, Mathematical analysis, Differential equations.

Surface waves on the boundary of a gyrotropic medium (ferromagnet, plasma) have special properties. The phase velocities of these waves and the structure of their field depend on the direction of propagation along the boundary and, under specific conditions, the surface waves are propagated along the interface on just one side. These specific peculiarities of surface waves were previously analyzed for the boundaries of a ferromagnetic medium (ferrite) from the viewpoint of using these properties in the construction of gates. Surface waves are analyzed in a gyrotropic medium of another kind, on the boundaries of a plasma in a magnetic field. The phenomena are considered to play a certain part in radiowave propagation in the ionosphere. (Author)

AD-262 524 Div. 25
(6 Sep 61) OTS price $1.60

Friedman, Morris D., West Newton, Mass.
CONCENTRATED EXCITATION OF A METAL CYLINDER WITH A DIELECTRIC COATING,
by M. S. Bobrovnikov and R. P. Starovoitova. Aug 61, 11p. incl. illus. (Translation no. B-189, of Izvestiia VUZ, Radiotekhnika, 4:140-147, 1961)
(Contract AF 19(604)5969)
(AFCRL-588) Unclassified report

DESCRIPTORS: *Electromagnetic waves, Conductors, Magnetic fields, Magnetohydrodynamics, *Cylindrical bodies, Metals, Coatings, Dielectrics, *Excitation, USSR, Shielding, Translations, Surfaces, Mathematical analysis, *Dielectric films.

The problem is analyzed of the symmetric concentrated excitation of an infinitely long metal cylinder covered with a dielectric layer by a ring of magnetic flux. It is shown that a plane surface wave propagated along the cylinder and a spherical radiation wave are here excited. The efficiency of the excitation of the surface wave is determined (the ratio between the surface and space wave energies). The radiation resistances of the emitting system is found. (Author)

AD-262 525 Div. 25
(6 Sep 61) OTS price $1.60

Friedman, Morris D., West Newton, Mass.
ON AN ANALOG OF THE DUHAMEL INTEGRAL FOR SIGNALS WITH BOUNDED SPECTRUM,
by N. I. Kaushanskii. Aug 61, 9p. (Translation no. K-256, of Izv. VUZ, Radiotekh., 4:192-197, 1961)
(Contract AF 19(604)5969)
(AFCRL-589) Unclassified report

DESCRIPTORS: Differential equations, *Integral transforms, Fourier analysis, *Time lag theory, Linear systems, Radiofrequency spectrum analyzers, *Radio signals, Mathematical analysis, Series, Functions, Translations.

An approximate method of analyzing signals with bounded spectrum is analyzed by using relations similar to the Duhamel integral. (Author)

AD-262 527 Div. 25
(6 Sep 61) OTS price $1.60

Friedman, Morris D., West Newton, Mass.
PLANE WAVE INCIDENCE ON A SELECTIVE REFLECTING SURFACE,
by N. V. Talyzin. Aug 61, 13p. incl. illus. (Translation no. T-155, of Elektrosviaz' 15:8-17, 1961)
(Contract AF 19(604)5969)
(AFCRL-707) Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Electromagnetic wave reflections, Surfaces, Reflection, Surface properties, Impedance, Energy, Reflectors, Wave transmission, Metals, Bessel functions, Fourier analysis, Differential equations, Functions, *Solid state physics.

Normal incidence is considered of a plane wave on a selective reflecting surface which is in the form of a system of separate resonating elements, dipoles. The secondary field of the selective surface, the current excited in the dipoles by the incident field and the reflection and transmission coefficients are determined. Graphs are given which permit the computation of the reflection and transmission coefficients of a selective reflecting surface in a wide wave band. Experimental results are presented for the transmission coefficients. (Author)

AD-262 535 Div. 25
(6 Sep 61) OTS price $5.60

Institute for the Study of Metals, U. of Chicago, Ill.
HEAT CAPACITY AND ENTROPY OF CuCl2 AND CrCl2 FROM 11 TO 300 K. MAGNETIC ORDERING IN LINEAR CHAIN CRYSTALS,
by J. W. Stout and R. C. Chisholm. Aug 61, 57p. incl. illus. tables (Technical rept. no. 7)
(Contract Nonr-212113)
Unclassified report

DESCRIPTORS: *Copper compounds, *Chromium compounds, *Chlorides, Thermodynamics, *Antiferromagnetism, Specific heat, Entropy, Enthalpy, Nuclear magnetic dipole moments, Magnetic properties, Crystals, Crystal structure, Lattices, Quantum mechanics, Magnetic moments.

The heat capacities of CuCl2 and CrCl2 have been measured between 11 and 300 K. The contribu-

tions to the entropy and heat capacity arising from the ordering of the magnetic moments are evaluated. Maxima in the heat capacity are found at 23.91 + or - 0.1 K for CuCl2 and 16.06 + or - 0.05 K for CrCl2. Both compounds show gradual maxima in the magnetic contribution to the heat capacity at higher temperatures. By use of the Ising model to describe interactions within a chain and a molecular field to describe the secondary interactions, an approximate theoretical treatment is given. Smooth values of the heat capacity, entropy, enthalpy, and free energy are tabulated at selected temperatures. (Author)

AD-262 536 Div. 25
(6 Sep 61) OTS price $1.10

Institute for the Study of Metals, U. of Chicago, Ill.
DIFFRACTION STUDIES OF CRYSTAL IMPERFECTIONS.
Final rept. 1 July 58-30 June 61,
by Christopher B. Walker. 14 Aug 61, 7p.
(Contract DA 11-022-ORD-2803, Proj. 5B99-01-004 and TB2-0001)
(AROD rept. no. 2178:2)
Unclassified report

DESCRIPTORS: *Crystals, Crystal structure, *Lattices, *Metallic crystals, *Intermetallic compounds, *Diffraction, Scattering, Temperature, Phase studies, Phase transitions, Neutron diffraction analysis, X-ray diffraction analysis, Single crystals, Copper compounds, Gold compounds, Silver compounds, Cadmium compounds, Lead compounds, Magnesium compounds, Iron compounds, Cobalt compounds, Chromium compounds, Alloys.

Research on the following 5 reports is summarized: (1) The effect of temperature on local order diffuse scattering from alloys. I; (2) The effect of temperature on local order diffuse scattering from alloys. II. Alloys with atomic size effects; (3) Short-range order in Cu3Au; (4) Order in beta-AgCd; and (5) Solid solubility of Pb in Mg below 300 C. Problems considered during the report period included order-disorder transformations, lattice vibrations, point imperfections and diffraction theory. Research was incomplete on: (a) A neutron diffraction study of short range order in beta-brass; (b) Order in FeCo and FeCr alloys; (c) Temperature diffuse scattering in powders; and (d) Point defects in crystals. Measurements were made in the beta-brass study of the diffuse scattering of monochromatic thermal neutrons from single crystals of beta brass at temperatures above the critical temperature. Long range ordering in FeCo, Fe3Co and FeCr(b) was investigated by neutron diffraction.

AD-262 537 Div. 25
(6 Sep 61) OTS price $3.60

Institute for the Study of Metals, U. of Chicago, Ill.
HEAT CAPACITY AND ENTROPY OF CoCl2 AND MnCl2 FROM 11 TO 300 K. THERMAL ANOMALY ASSOCIATED WITH ANTIFERROMAGNETIC ORDERING IN CoCl2,
by R. C. Chisholm and J. W. Stout. Aug 61, 34p. incl. illus. tables (Technical rept. no. 6)
(Contract Nonr-212113)
Unclassified report

DESCRIPTORS: *Cobalt compounds, *Manganese compounds, *Chlorides, Lattices, Crystal structure, Crystals, *Thermodynamics, Entropy, Enthalpy, Specific heat, Electron transitions, Atomic energy levels, Atomic orbitals, Excitation, *Antiferromagnetism, Magnetic properties, Quantum mechanics, Magnetic moments.

The heat capacities of MnCl2 and CoCl2 have been measured between 11 and 300 K. The lattice and magnetic contributions to the heat capacity and entropy of MnCl2 were also evaluated. CoCl2 has a lambda peak in heat capacity at 24.71 + or - 0.05 K associated with the cooperative ordering of the magnetic moments of the cobaltous ions. The entropy change associated with this cooperative ordering is R ln 2. Smooth values of the heat capacity, entropy, enthalpy, and free energy are tabulated at selected temperatures. (Author)

AD-262 591 Div. 25
(7 Sep 61) OTS price $2.60

Western Ontario U. (Canada).
TRANSITION PROBABILITIES OF MOLECULAR BAND SYSTEMS. XVIII: FRANCK-CONDON FACTORS TO HIGH VIBRATIONAL QUANTUM NUMBERS I: N2 AND N2(+),
by R. W. Nicholls. 15 May 61, 14p. tables, 70 refs. (Scientific rept. no. 6 on Contract AF 19(604)4560, Scientific rept. no. 3 on Contract AF 49(638)640, and Contract Nonr-289500)
(Contracts AF 19(604)4560, AF 49(638)640, and Nonr-289500)
(AFCRL-605)
(AFOSR-674) Unclassified report

DESCRIPTORS: *Molecules, Molecular spectroscopy, *Quantum mechanics, *Electron transitions, Computers, Tables, *Nitrogen, Probability, *Atomic energy level.

Franck-Condon factor arrays are computed to the highest vibrational quantum numbers that are spectroscopically realistic, for a number of important molecular band systems. Morse potentials are assumed and the integrations are performed on an electronic computer. (Author)

AD-262 592 Div. 25
(7 Sep 61) OTS price $1.60

Western Ontario U. (Canada).
TRANSITION PROBABILITIES OF MOLECULAR BAND SYSTEMS XIX. FRANCK-CONDON FACTORS TO HIGH VIBRATIONAL QUANTUM NUMBERS II: SiO, MgO, SrO, AlO, VO, NO-BETA, GAMMA,
by R. W. Nicholls. 15 May 61, 2p. tables.
(Scientific rept. no. 7 on Contract AF 19(604)4560, Scientific rept. no. 4 on Contracts AF 49(638)640, and Contract Nonr-289500)
(AFCRL-606)
(AFOSR-675) Unclassified report

DESCRIPTORS: *Brillouin zones, *Molecules, Molecular spectroscopy, *Quantum mechanics, *Electron transitions, Computers, Tables, *Oxides, Aluminum compounds, Magnesium compounds, Nitrogen compounds, Silicon compounds, Strontium compounds, Vanadium compounds, Probability, *Atomic energy levels.

Franck-Condon factor arrays to high vibrational quantum numbers are computed for the following band systems of diatomic oxides: SiO, MgO, SrO, AlO, VO, NO. (Author)

Division 25-PHYSICS

AD-262 593 Div. 25
(6 Sep 61) OTS price $1.60

Western Ontario U. (Canada).
TRANSITION PROBABILITIES OF MOLECULAR BAND SYSTEMS. XX. TABULATED KLEIN-DUNHAM POTENTIAL ENERGY FUNCTIONS FOR TEN STATES OF C2(4), O2(2), OH(2) AND SiO(2),
by W. R. Jarmain. 1 July 61, 15p. incl. tables.
(Scientific rept. no. 8 on Contract AF 19(604) 4560, Scientific rept. no. 1 on Grant no. AF-AFOSR 61-88, and Scientific rept. no. 5, on Contract Nonr-289500)
(Contract AF 19(604)4560, Continuation of Contract AF 19(122)470; Grant no. AF-AFOSR 61-88; and Contract Nonr-289500)
(AFCRL-682)
(AFOSR-1124) Unclassified report

DESCRIPTORS: *Molecules, *Quantum mechanics, Electron transitions, Carbon, Oxygen, Hydroxides, Silicon compounds, Monoxides, Oxides, Probability, *Atomic energy level.

Sets of classical turning points, together with the corresponding vibrational energies, are given at an interval of one half a unit of quantum number for the following molecular states: C_2, $X^3\pi_u$, $A^3\pi_g$, $B^3\pi_g$, $c^1\pi_g$; O_2, $X^3\Sigma_g^-$, $B^3\Sigma_u^-$; OH, $X^2\pi_i$, $A^2\Sigma^+$; SiO, $X^1\Sigma^+$, $A^1\pi$. These numbers, representing points on potential curves, were derived from Klein's formulae by analytical differentiation, and numerical integration with a necessary analytic approximation over a small part of the range. (Author)

AD-262 598 Div. 25
(6 Sep 61) OTS price $1.60

Westinghouse Electric Co., Pittsburgh, Pa.
(No Title).
Final rept.,
by R. I. Longini and A. I. Bennett. 7 June 61, 8p. incl. illus. table.
(Contract AF 49(638)599)
(AFOSR-960) Unclassified report

DESCRIPTORS: Germanium, Silicon, Indium compounds, Antimonides, *Crystals, Growth, Crystal structure, Chemical impurities, Semiconductors, Lattices.

Research was concerned with crystal growth mechanisms through the study of dendritic growth in diamond-lattice semiconductors, specifically germanium, silicon, and indium antimonide. Dendrites of these materials grow, in a supercooled melt, as long, narrow ribbons having a central core of twin planes. The ribbon faces can be made to be nearly atomically flat. The process of elongation of the dendrite involves the twinned core structure as a necessary part of the growth. Thickening and widening appear to depend on other growth mechanisms which do not involve the twin planes. The presence of impurities at concentrations of the order of 10 to the 18th power atoms/cc or more affect the growth habit in a fashion not yet quantitatively understood. (Author)

AD-262 608 Div. 25
(7 Sep 61) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
THE SPREADING OF THE PLASTIC ZONE IN AN INHOMOGENEOUS TUBE UNDER THE DYNAMIC INFLUENCE OF PRESSURE,
by M. A. Zadoyan. 7 Aug 61, 9p. (Trans. no. MCL-1114 of Izvestiya Akademii Nauk Armyanskoy SSSR, Fiziko-Matematicheskiye Nauki, 13:89-95, 1960)
Unclassified report

DESCRIPTORS: *Pipes, Cylindrical bodies, Plasticity, Elasticity, *Deformation, Pressure, Compression shock, Theory, USSR, Stresses.

AD-262 611 Div. 25
(7 Sep 61) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
THE STRUCTURE OF A SHOCK WAVE IN AIR, TAKING INTO ACCOUNT THE KINETICS OF CHEMICAL REACTIONS,
by N. M. Kuznetsov. 7 Aug 61, 12p. incl. illus.
(Trans. no. MCL-1118 of Inzhenerno-Fizicheskiy Zhurnal 3:17-24, 1960)
Unclassified report

DESCRIPTORS: *Air, *Shock waves, Kinetic theory, Chemical reactions, Equations, Temperature, Velocity, Gases, Density, Dissociation, Oxygen, Nitrogen, Reaction kinetics.

Practical formulas are given for solving the problem of the distribution of the temperature and concentration of the components of dissociating air in the non-equilibrium zone beyond the steep leading edge of a shock wave in rarefied air. The question of the dissociation of oxygen and nitrogen, and the relationship between the temperature beyond the edge of the wave and the wave velocity and gas density is also examined. (Author)

AD-262 612 Div. 25
(7 Sep 61) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
THE INFLUENCE OF INITIAL CONDITIONS ON THE ORIGIN OF THE BOILING CRISIS WITH NON-UNIFORM HEATING OF THE PERIMETER OF A PIPE,
by I. L. Mostinskiy. 7 Aug 61, 8p. incl. illus.
(Trans. no. MCL-1119 of Inzhenerno-Fizicheskiy Zhurnal 3:5-10, 1960)
Unclassified report

DESCRIPTORS: High pressure research, *Boiling, *Steam pipes, Fluid flow, *Heat transfer, Steam, Water vapor, Steam power plants, Translations, USSR.

Effort was directed to a determination of the critical heat flows and an investigation of the manner in which they are influenced by non-uniform heating of the perimeter of the pipe with strong throttling of the working medium at the inlet. Steam with critical parameters (P equals 300 abs atm, t sub per equals 600 C) passed from the boiler to the steam cooler with the required cooling surface, where it was cooled down to a specific heat content, and then to the experimental section. In this section the working medium was throttled to a pressure close to atmospheric and the water-vapor mixture entered the condenser. Seamless pipes made of EYa1T stainless steel were used in the experimental section. The pipes were heated by passing an electric current through them. The values of the local and mean heat flows were determined from the measured current, the geometric dimensions and the known electrical resistance of the

pipe material. With non-uniform heating of the pipe around the perimeter the boiling crisis always occurred in the zone of maximum heating, and the local heat flow in this zone was taken as the critical heat flow. Bubble boiling continued in the zone of realitively weak heating. (Author)

AD-262 638 Div. 25, 17, 22
(8 Sep 61) OTS price $1.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
EXPERIMENTAL STUDY OF MAGNETIC EFFECTS IN STEEL UNDER EXPLOSIVE LOADING,
by Robert E. Franz. June 61, 21p. incl. illus.
(BRL memo. rept. no. 1353)
(Proj. 503-04-002)
Unclassified report

DESCRIPTORS: *Steel, Magnetic properties, Shock waves, *Magnetic effects, Explosions, Wave transmission, Magnetic materials, Velocity, Measurement, Pressure, Ferromagnetic materials, Stresses, Load distribution.

A series of experiments were performed in order to study the magnetic effects of pressure waves propagated in magnetized steel rods. Typical cases are shown for different values of magnetization. Measurements of wave velocity were made and a value of 5.936 ± 0.092 mm/mu sec obtained. Correlation of pressure levels with static tests was found to be poor. (Author)

AD-262 654 Div. 25
(8 Sep 61) OTS price $3.60

General Electric Co., Schenectady, N. Y.
RESEARCH ON CdTe.
Quarterly progress rept. no. 1, 1 May-31 July 61, by R. E. Halsted, M. R. Lorenz, and D. T. F. Marple, 31 July 61, 36p. incl. illus. table.
(Contract AF 33(616)8264)
Unclassified report

DESCRIPTORS: *Semiconductors, *Single crystals, *Intermetallic compounds, Fluorescence, Luminescence, Photoemission, Reflection, Photoconductivity, Spectroscopic analysis, Absorption, Photons, Energy, Temperature, Pressure, Chemical impurities, Crystals, Test equipment, Photoelectric cells, Solar cells, Theory, Solid state physics, *Cadmium compounds, *Tellurides.

The program is aimed at the measurement and interpretation of optical constants from the lattice vibration absorption region in the IR to energies at least 10 v greater than the first band gap. Reflectance was measured from cleaved faces of single crystals at normal incidence in the 4 to 11.5 ev range, and at an 80 degree angle of incidence with polarized radiation in the 1.5 to 5 ev region.

This report includes:
BAND EDGE EMISSION PROPERTIES OF CdTe, by R. E. Halsted, M. R. Lorenz, and B. Segall, 1961, 20p. incl. illus. table.
(Contract AF 33(616)8264)

To be presented at the International Conference on Photoconductivity at Cornell University, Ithaca, N. Y. on Aug 24-27, 1961.

Near band edge fluorescent emission in CdTe is discussed. Longitudinal optical phonon spacing between emission lines was observed at 20 K.

AD-262 673 Div. 25
(8 Sep 61) OTS price $7.60

National Bureau of Standards, Boulder, Colo.
PROVISIONAL THERMODYNAMIC FUNCTIONS FOR PARA HYDROGEN,
by R. D. Goodwin, D. E. Diller and others.
4 Aug 61, 80p. incl. illus. tables (NBS rept. no. 6791)
(Sponsored by Air Research and Development Command and National Aeronautical and Space Administration)
Unclassified report

DESCRIPTORS: *Hydrogen, *Thermodynamics, *Liquefied gases, *Gases, Vapors, High pressure research, Low temperature research, Pressure, Density, Volume, Programming, Equations of state, Errors, Isotopes, Tables.

The need for thermodynamic functions of para hydrogen, especially in compressed liquid and dense fluid states, prompts the tabulation of these provisional properties, computed by approximate methods utilizing the new PVT data of these reports. Computation and preparation of the tables is discussed under the following: Approximate Computational Methods; Correlation Methods; Discussion of Errors; and Tables of Functions.

AD-262 680 Div. 25, 8
(8 Sep 61) OTS price $2.60

University of Southern Calif. Engineering Center, Los Angeles.
ELECTRIC CONDUCTIVITY OF A HIGH TEMPERATURE PLASMA TO A RADIO WAVE.
Technical note,
by Toyoki Koga. July 61, 26p. incl. illus. table.
(Rept. no. USCEC 83-207)
(Contract AF 49(638)831, Proj. 9783)
(AFOSR-1184) Unclassified report

DESCRIPTORS: *Plasma physics, *Radio waves, High temperature research, Electric fields, Particles, Wave transmission, Magnetic fields, Equations, Mathematics, Integration, Tables, Conductivity, *Propagation.

The effect of the temperature of a fully ionized plasma on its conductivity in the presence of a radio wave is investigated, taking into consideration the finite wavelength of the radio wave. The order of the effect is kT/(ma squared) where T is the temperature of the gas, m the mass of an electron, k the Boltzmann constant, and a the phase velocity of the wave. (Author)

AD-262 692 Div. 25
(11 Sep 61) OTS price $9.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
TABLES OF THERMODYNAMIC PROPERTIES OF AIR FROM 90 TO 1500 K,
by R. L. Humphrey and C. A. Neel. Aug 61, 112p. incl. illus. tables (Rept. no. AEDC-TN-61-103)
(Contract AF40(600)800)
Unclassified report

DESCRIPTORS: *Air, *Thermodynamics, Tables, Pressure, Density, Gases, Enthalpy.

Tables are presented for the thermodynamic properties of air from 90 to 1500 K using (1) temperature and pressure and (2) temperature and density as independent variables. The

pressure tables range from 1 to 1200 atmospheres, whereas the density tables extend from 10 to the -7th power to 400 relative atmospheres (or amagat units). The tabulated properties are the compressibility factor Z, the dimensionless functions E/RT, H/RT and S/R, together with pressure and density. The tables account for the so-called real gas effects (van der Waals' effects) at high pressures, but do not include the effects of the small amounts of dissociation at low pressures and high temperatures. The sources for the tables as well as the final tables are discussed. (Author)

AD-262 699 Div. 25
(11 Sep 61) OTS price $2.60

Frankford Arsenal, Philadelphia, Pa.
SIMPLIFIED METHODS OF UTILIZING DISTORTION ENERGY CONCEPT FOR THE DESIGN AND STRESS ANALYSIS OF TUBES AND CHAMBERS,
by A. M. Stott. Jan 61, 26p. incl. illus. tables.
(Technical note no. TN-1110)
Unclassified report

DESCRIPTORS: *Elastic shells, Stresses, Mathematical analysis, *Elasticity, Design.

It is possible to apply the distortion energy theory to tubes and chamber walls to determine equivalent stresses which, in ductile materials, have been found to be in close agreement with stresses occurring under actual conditions. Mathematical derivations and simplified methods of stress analysis and design calculation are given, together with examples. (Author)

AD-262 715 Div. 25, 4
(11 Sep 61) OTS price $1.25

Naval Ordnance Lab., White Oak, Md.
THERMAL EMISSION SPECTRA FROM THE NOL ADIABATIC COMPRESSOR.
Rept. on Spectroscopic Studies of High Pressure Gases,
by Gordon L. Hammond. 7 Feb 61, 39p. incl. illus. tables, 17 refs.
(NAVWEPS rept. no. 7369)
Unclassified report

DESCRIPTORS: *Compressors, Thermal radiation, *Gases, Spectrographic analysis, Tungsten, Graphite, Copper, Reduction, Mercury, Argon, Helium, Metals, Vapors.

The thermal radiation emitted from rapidly compressed monatomic gases in the NOL Adiabatic Compressor was spectrographically analysed, and shown to be the spectra of vaporized components of the compressor. Experiments to introduce and to excite selected emitters in the compressor were successful, whereas experiments to eliminate the radiation from the vaporized compressor components met with only partial success. Effects due to collisions of the emitting atoms with perturbing atoms were observed in the radiation; namely, the lines are broadened, shifted, and exhibit asymmetric intensity profiles. Measurements of the shift of some lines as a function of relative density of the perturbing gas are presented, and observations of diffuse, satellite bands on the short wavelength side of some of the atomic lines are reported. (Author)

AD-262 728 Div. 25
(11 Sep 61) OTS price $1.10

University of Southern Calif., Los Angeles.
A LABORATORY STUDY OF GASES AND VAPORS EASILY PHOTOIONIZED IN THE UPPER ATMOSPHERE.
Final rept.,
by G. L. Weissler. 15 Feb 61, 6p.
(Contract AF 19(604)5699)
(AFCRL-287) Unclassified report

DESCRIPTORS: *Photochemical reactions, *Ionization, *Absorption, Upper atmosphere, Vapors, Gases, *Ultraviolet spectroscopy, Hydrocarbons, Alkali metals, Alkaline earths, Sodium, *Ionosphere.

The research was primarily for the purpose of finding certain gases and vapors which could be easily photoionized in the upper atmosphere. Since the point of release of these gases by a rocket was to be in the neighborhood of 100 km, their photoionization would be produced by solar radiation in the neighborhood of Lyman-alpha (1216A). For this purpose two groups of vapors were chosen for laboratory investigation of their respective photoabsorption and photoionization cross sections: (1) 10 organic vapors: ethane, propane, n-butane, n-pentane, ethylene, propylene, cis-butene 2, 1,3-butadiene, acetylene, and cyclopropane, and (2) the vapors of the alkali metals and of the alkali earths. In the first case, each was subjected to monochromatic radiation in the energy range h nu equals 9 to 25 ev provided by a Seya-type vacuum monochromator. With this radiation, absorption cross sections and photoionization cross sections were measured. In the second case, new experimental results were provided on the absorption coefficients of sodium vapor between 1800A and 1080A. A very strong absorption peak was observed at 1400A. (Author)

AD-262 729 Div. 25
(11 Sep 61) OTS price $7.60

University of Southern Calif., Los Angeles.
ABSORPTION, IONIZATION, AND ION FRAGMENTATION CROSS SECTIONS OF HYDROCARBON VAPORS FOR VACUUM ULTRAVIOLET RADIATION,
by Richard I. Schoen,. 15 June 60, 79p. incl. illus. tables, 100 refs. (Technical rept. no. 1)
(Contract AF 19(604)5699)
(AFCRL TN 60-679) Unclassified report

DESCRIPTORS: *Absorption, *Photochemical reactions, *Ionization, Gas ionization, *Ultraviolet radiation, *Hydrocarbons, *Vapors, Upper atmosphere, Ethanes, Propanes, Propenes, Butanes, Pentanes, Butenes, Ethylenes, Butadienes, Acetylenes, *Ultraviolet spectroscopy.

The vapors studied were: ethane, propane, n-butadiene, n-pentane, ethylene, propylene, cis-butene 2, 1,3-butadiene, acetylene, and cyclopropane. Monochromatic radiation in the energy range 9 to 25 ev was provided by a Seya type vacuum monochromator. With this radiation, absorption cross sections were determined and ionization cross sections were measured. All three kinds of cross sections had certain features in common. When plotted against energy, a typical cross section curve rose smoothly and monotonically with increasing energy to a single maximum, then fell somewhat more slowly than it rose. Characteristically, the maxima of the ionization and absorption cross sections were both between 14 and 18 ev. At 1215A, the ionization efficiency of propylene was found to be 12%; of cis-butene 2, 9%; of 1,3-butadiene, 13%; and of all other hydrocarbons studied, 0%. It was deduced that

the ionization threshold of a hydrocarbon should probably not be more than 9.7 ev if it is to produce useful quantities of ionization in direct, single photon processes in the upper atmosphere. (Author)

AD-262 730 Div. 25, 2
(11 Sep 61) OTS price $2.60

University of Southern Calif., Los Angeles.
THE ABSORPTION COEFFICIENTS OF THE ALKALI METALS AND THE ALKALI EARTHS,
by Robert D. Hudson. 28 June 60, 21p. incl. 25 refs. (Technical rept. no. 2)
(Contract AF 19(604)5699)
(AFCRL TN 60-680) Unclassified report

DESCRIPTORS: *Alkali metals, *Alkaline earth metals, Spectrographic analysis, Ultraviolet spectroscopy, *Atomic spectrum, Molecular spectroscopy, *Absorption, Ionization, Theory, Lithium, Sodium, Potassium, Rubidium, Cesium, Beryllium, Magnesium, Calcium, Strontium, Barium, Vapors, Atmosphere, Metals, *Bibliography.

A literature study of the alkali metals and the alkali earths is presented along with some new experimental results on the absorption coefficient of sodium from 1800 to 1080 angstroms. (Author)

AD-262 740 Div. 25
(11 Sep 61) OTS price $1.60

New Mexico U. Engineering Experiment Station, Albuquerque.
RECOMBINATION AND ATTACHMENT PROCESSES IN A REGION OF NON-UNIFORM DENSITY AT IONOSPHERIC ALTITUDES,
by George R. Swain. Mar 61, 15p. incl. illus. table (Rept. no. EE-49)
(Contract AF 19(604)2436)
(AFCRL-184) Unclassified report

DESCRIPTORS: *Recombination reactions, Gas ionization, Electrons, Density, Dissociation, Ions, Ionosphere, Mathematical analysis, Partial differential equations, Particles.

The loss rate of electrons by recombination and attachment in a region of non-uniform density is examined. It is assumed that the over-all distribution of particles in space with time is known. It is found that the effects of dissociative, ionic, and radiative recombination, electron attachment, and collisional detachment may be approximately represented by a single effective recombination coefficient. (Author)

AD-262 746 Div. 25
(5 Sep 61) OTS price $4.60

Brown U., Providence, R. I.
ON THE IMPLICATIONS OF ELECTRON DIFFUSION THROUGH A HYPERSONIC SHOCK FRONT,
by Lewis Wetzel. May 61, 34p. incl. illus. 11 refs. (Scientific rept. no. AF 4561/11)
(Contract AF 19(604)4561)
(AFCRL-582) Unclassified report

DESCRIPTORS: *Shock waves, Plasma physics, Plasma jets, *Gas ionization, Rare gases, Gases, Ionization, Electric fields, Ions, Electrons, Hypersonic flow, Scattering, *Electromagnetic waves, Reflection, Theory, Diffusion.

Recent experiments disclosed electrical effects well ahead of an advancing shock front. Certain of these effects were attributed to the diffusion of electrons through the shock front from the ionized region behind it. The diffusion hypothesis is examined in terms of a simple heuristic model, in which the diffusion is assumed to take place from a plane electron source moving with the shock velocity. The predictions of this model are generally consistent with the available experimental evidence. It is shown that the transient behavior of the precursor electron distribution is capable of increasing the Doppler shift of an electromagnetic wave reflected from the shock. Although the transient decays rapidly after the creation of the shock, there are conditions under which it should last long enough to allow an experimental check of this effect. (Author)

AD-262 768 Div. 25
(12 Sep 61) OTS price $1.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
DIFFRACTION OF ELECTRONS ON COPPER MONOCRYSTAL SURFACES UNDER HIGH TEMPERATURE,
by E. Menzel, tr. by George R. Loehr. July 61, 17p. incl. illus. tables (Technical note no. FRL-TN-22, Trans. from Zeitschrift fur Physik, 142:245-258, (1955)
Unclassified report

DESCRIPTORS: *Electrons, *Diffraction, *Copper, *Single crystals, Surfaces, High temperature research, Metallic crystals, Surface properties, Magnetic fields, Electron beams, Lattices, Deformation, Reflection, Translations, *Electron diffraction analysis, Germany.

The effect of temperature on the diffraction of electrons subjected to reflection and irradiation was investigated. In addition a new process for the production of monocrystals with very clean surfaces gave satisfactory results. Interference of the magnetic field of the heated specimens with the electron beam was elimiated by using alternate periods of heating and observation. When the temperature is increased, the heat vibrations of the atoms reduce the contrast of the reflections, starting with those having a high index. From this, a conclusion may be reached concerning the interrelation between atom amplitude and temperature. In the irradiation experiment, where the interior of the crystal asserts itself, the atoms are linked to their positions of rest approximately in accordance with a linear energy law. In the reflection experiment, the crystal surface dtermines the action; here the atoms are subject to a linkage force which increases less than linearly with the amplitude. (Author)

AD-262 800 Div. 25, 9
(12 Sep 61) OTS price $2.60

Ionosphere Research Lab., Pennsylvania State U., University Park.
A REVIEW OF THE MACROSCOPIC EQUATIONS FOR A NON-

REACTING PLASMA,
by S. Chandra. 1 July 61, 21p. (Scientific rept. no. 149)
(Contract AF 19(604)4563)
(AFCRL-837) Unclassified report

DESCRIPTORS: *Plasma physics, Gas ionization, *Equations, Gravity, Electromagnetic fields, Transport properties, Mathematical analysis, Differential equations.

The macroscopic equations for a non-reacting plasma are deduced using the classical Maxwell-Boltzmann Equation. The general form of these equations is presented in a rotating coordinate system, taking into account the gravitational and electromagnetic fields, but neglecting relativistic and quantum mechanical effects. (Author)

AD-262 801 Div. 25
(12 Sep 61) OTS price $1.60

Princeton U., N. J.
THE INFRARED SPECTRA AND STRUCTURES OF THE CRYSTALLINE PHASES OF CH_4 AND CD_4,
by George B. Savitsky and Donald F. Hornig. 15 Aug 61, 20p. incl. illus. 14 refs. (Technical rept. no. 10)
(Contract Nonr-185827, Proj. NR 014-203)
Unclassified report

DESCRIPTORS: *Methanes, *Deuterated compounds, Crystal structure, Crystals, Lattices, *Phase studies, Phase transitions, *Infrared spectroscopy, Spectrographic analysis, Hyperfine structures, Solutions, Low temperature research, Theory, Absorption, Molecular spectroscopy.

IR spectra of CH_4 and CD_4, in the region of the stretching and bending modes were obtained in all of their crystalline phases between 5 K and 40 K. The spectra of dilute solutions of CH_4 and CD_4 in one another were studied through the same temperature range. The spectra of the dilute solutions consist of single sharp lines for both fundamentals, demonstrating that the barriers to molecular rotation are high in all the phases. The fine structure observed in the low temperature phases of pure crystals is inconsistent with any of the structural models heretofore proposed but 2 models for phase II are suggested which are consistent with the spectra and which show efficient packing. Phase III of CD_4 is probably complex and of low symmetry. Phase I is probably disordered. (Author)

AD-262 802 Div. 25
(12 Sep 61) OTS price $2.60

Princeton U., N. J.
ON DOUBLE-MINIMUM POTENTIALS IN HYDROGEN BONDED SOLIDS,
by R. L. Somorjai and D. F. Hornig. Sep 61, 29p. incl. illus. tables, 22 refs. (Technical rept. no. 11)
(Contract Nonr-185827, Proj. NR 014-203)
Unclassified report

DESCRIPTORS: Hydrogen, Hydrogen compounds, *Chemical bonds, *Electric potential, Infrared spectroscopy, Raman spectroscopy, Molecular spectroscopy, Absorption, Integral equations, Matrix algebra, Theory Protons, Deuterated compounds, Atoms, Molecules, Atomic energy levels, *Solids.

Using a simple one-dimensional model of H bonds, vibrational energy eigenvalues, eigenfunctions, transition moments and absorption intensities are calculated for a series of symmetric and asymmetric double-minimum (D.M.) potentials. On the basis of the results obtained, the necessary requirements for observing doublets in the IR spectra of H-bonded solids are given. Certain misconceptions about the relation between D.M. potentials and IR spectra are cleared up. Attention is drawn to the rapid switch-over from even-odd, odd-even to left-left, right-right selection rules when introducing a slight asymmetry into a symmetric D.M. potential. Also, a very rapid uncoupling of resonance interaction between accidentally coincident left and right levels of strongly asymmetric D.M. potentials is predicted. The importance of obtaining accurate relative intensity values, of determining the infrared and Raman spectra of both the H-bonded solids and their deuterated analogs at different temperatures and investigating the low frequency region of a spectrum is emphasized. (Author)

AD-262 923 Div. 25
(14 Sep 61) OTS price $3.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
FREE CARRIER FARADAY AND VOIGT EFFECTS FOR A CUBIC CRYSTAL WITH A Pb-Te LIKE BAND STRUCTURE,
by John Halpern. 25 Aug 61, 29p. illus. (Rept. no. 85G-0011)
(Contract AF 19(604)7400)
Unclassified report

DESCRIPTORS: Solid state physics, *Lead compounds, *Tellurides, *Brillouin zones, Polarization, Magneto-optic rotation, Electromagnetic waves, Mathematical analysis, Vector analysis, Transformations (Mathematics).

The free carrier Faraday and Voigt effects for selected directions of small applied magnetic field are here worked out for a cubic crystal with a band structure like that of lead-telluride. (Author)

AD-262 954 Div. 25, 4
(13 Sep 61) OTS price $1.10

Unified Science Associates, Inc., Pasadena, Calif.
STABLE DENSE COLD PLASMA.
Semiannual summary rept. for period ending 31 Aug 61,
by S. Naiditch. 31 Aug 61, 8p.
(Contract Nonr-343700)
(ARPA Order no. 194-61) Unclassified report

DESCRIPTORS: *Plasma physics, Gases, Gas ionization, Metals, *Sodium, Synthesis, Physical properties, Thermodynamics, Stability, Chemical reactions, Dielectric properties, Solvent action, Ammonia, Electrons, Density, Solvates, Vapors, Ionization, Ions.

Metallic gaseous solutions with significant lifetimes were synthesized at low temperatures. These plasmas are thermodynamically stable with respect to the ionization process, but unstable with respect to the chemical reaction between metal solute and gaseous solvent. Cold dense gaseous plasmas have been prepared and maintained at 137 C for 6 minutes and at 149 C for 7 minutes. These plasmas, contained in glass capil-

laries, look like gold-copper wires. Use of a gaseous solvent produces a medium which provides a high dielectric constant and solvation. These effects permit the existence of gaseous sodium at high concentrations in highly ionized states at the relatively low temperatures of 133 to 200 C. (Author)

AD-262 966 Div. 25, 4
(6 Sep 61) OTS price $3.60

University of Southern Calif., Los Angeles.
SUBSIDENCE RATES OF COLLOIDAL SILICA IN VARIOUS MIXED LIQUIDS COMPUTER SIMULATION OF THE SUBSIDENCE PROCESS.
Technical rept. no. 7 (Final), on Particle Interactions in Colloidal Systems in Non-Polar Media,
by Marjorie J. Vold. 30 June 61, 30p. incl. illus. tables.
(Contract DA 04-495-ORD-1296, Proj. TB2-0001)
(AROD rept. no. 1923:8,7)
Unclassified report

DESCRIPTORS: *Colloids, *Silicon compounds, Dioxides, Organic solvents, Liquids, Solutions, Solvates, Gels, Sedimentation, Physical properties, Physical chemistry, *Chemical bonds, Hydrogen, Molecular association, Particles, *Digital computers, Simulation, Probability.

AD-262 970 Div. 25, 9
(1 Sep 61) OTS price $1.10

Technische Hochschule, Hannover (Germany).
THE SUPPOSED EXCITATION OF PLASMA OSCILLATIONS BY GASDYNAMIC SHOCK WAVES IN A PLASMA (A). THE ELECTRO-MAGNETIC IRRADIATION BY LONGITUDINAL PLASMA-OSCILLATIONS WITHIN A MEDIUM WHICH IS NEITHER AFFECTED BY AN EXTERNAL MAGNETIC FIELD NOR BY FLOWS OF THE PLASMA AS A WHOLE (B). THE DEVELOPMENT OF GAS KINETIC METHOD ADAPTED TO HEAVY DEVIATIONS FROM THERMODYNAMIC EQUILIBRIUM AND THEIR APPLICATION TO STRONG PLASMA SHOCK WAVES WITH EXCITATION OF ELECTRON PLASMA OSCILLATIONS (C).
Annual summary rept.
27 Oct 60, 4p.
(Contract AF 61(052)161)
(AFCRL-392) Unclassified report

DESCRIPTORS: *Plasma physics, *Plasma oscillations, Shock waves, Electromagnetic waves, Propagation, Gases, Kinetic theory, *Magnetohydrodynamics, Astrophysics.

AD-262 973 Div. 25
(29 Aug 61) OTS price $2.60

Laboratoire Mediterraneen de Recherches Thermodynamiques (France).
FINAL RESULTS OBTAINED IN THE SETTING UP OF THE MOLECULAR GUN.
Final rept.,
by F. Marcel Devienne and J. C. Roustan. Mar 61, 27p. incl. illus. 21 refs.
(Contract AF 61(052)296)
(AFOSR-652) Unclassified report

DESCRIPTORS: *Ion rockets, Ion sources, Ion beams, Ion accelerators, Ionization, Molecular beams, Tungsten, Molecules, Gas ionization, Thermionic emission, Detection, France, Translations, Technological intelligence.

Contents:
Ion gun
Modifications to the ion accelerator
Production of charge or momentum exchanges between the high speed ions and the molecules
Detection and measurement of the speeds of the high speed molecules
Final modifications to the body of the apparatus

AD-262 974 Div. 25
(5 Sep 61) OTS price $1.60

Catholic U. of America, Washington, D. C.
LINEARITY AND MINIMUM ENTROPY PRODUCTION,
by P. H. E. Meijer. 2 Feb 59, 16p. (Technical note no. SM 1)
(Contract AF 49(638)452)
(AFOSR TN 59-152) Unclassified report

DESCRIPTORS: *Thermodynamics, *Entropy, *Linear systems, Quantum mechanics, Particles, *Equations, Functions, Integrals, Differential equations.

The application of the entropy production principle is discussed in terms of linear irreversible thermodynamics. The description of these processes is based on a set of linear, master equations. The most important aspect of these equations (Fokker-Planck) is that they are first order differential equations in time and are asymmetric in character. Conclusions are presented for both internal and external systems.

AD-262 985 Div. 25
(15 Sep 61) OTS price $15.00

Armour Research Foundation, Chicago, Ill.
STRESS WAVE PHENOMENA IN SEMI-SOLIDS.
Final rept., 3 Feb 60-3 Mar 61,
by W. F. Riley, I. M. Daniel, and A. J. Durelli. July 61, 200p. incl. illus. tables, 15 refs.
(Contract AF 29(601)2564, Proj. 1080; Continuation of contract AF 29(601)1167)
(AFSWC TR 61-25) Unclassified report

DESCRIPTORS: *Stresses, Wave transmission, Boundary layer, Photoelastic materials, Impact shock, Measurement.

The current program had as its objective the determination of the stress distribution at the boundary of several different discontinuities in a plate during passage of a stress pulse through the plate. In the previous research programs dynamic photoelasticity techniques and embedded grid techniques were developed for use in solving such problems. In the current program these techniques were further refined, dynamic moire techniques were developed, and a number of specific problems were solved. (Author)

AD-262 991 Div. 25
(25 Sep 61) OTS price $4.60

General Electric Co., Syracuse, N. Y.
A STUDY OF ATMOSPHERIC EFFECTS ON THE INFRARED SPECTRUM,
by R. H. Crompton. May 61, 38p. incl. illus. tables, 25 refs. (Rept. no. 6107)
(Contract DA 36-034-ORD-3360)
Unclassified report

DESCRIPTORS: *Infrared radiation, *Absorption, Wave transmission, Infrared windows, Water vapor, Carbon dioxide, Ozone, Atmosphere, Temperature, Pressure.

Division 25-PHYSICS

Contents:
Atmospheric absorption problem
  Basis of atmospheric absorption
  Significant atmospheric constituents
Water vapor absorption
  Absorption water vapor content of a slant path through the atmosphere
  A practical approach to water vapor content
Water vapor absorption models
  The Beer-Lambert law
  The method of Elder and Strong
  The Elsasser absorption model
  The Goody model
  Comparison of models
Carbon dioxide absorption
  Error function absorption model
  Absorption from CO2 in path length
Ozone absorption
  Error function ozone absorption model
  Absorption from ozone in path length
Total absorption
  Temperature and pressure effects
  Scan angles

AD-262 993 Div. 25
(15 Sep 61) OTS price $3.60

Boeing Scientific Research Labs., Seattle, Wash.
VARIATIONAL METHOD FOR THE QUANTUM STATISTICS OF INTERACTING PARTICLES,
by M. Girardeau. June 61, 35p. 16 refs. (Flight Sciences Lab. rept. no. 42; Document no. D1-82-0115, Supersedes Boeing Document no. D1-82-0080, AD-248 136)
Unclassified report

Also available from the author.

DESCRIPTORS: *Quantum mechanics, *Thermodynamics, *Thermal conductivity, Superconductivity, *Gases, Integrals, *Integral equations, Theory, *Functions, Operators (Mathematics), *Particles, Excitation, *Quantum statistics, Annihilation reactions, Statistical distributions, Potential theory.

A variational method is developed for calculating the thermodynamic potential of quantum-mechanical many-body systems with pair-wise interactions. The method is based on Peierls' theorem and yields an upper bound to the thermodynamic potential density in the limit of an infinite system. Evaluation and minimization of the bound involves solution of a set of coupled nonlinear integral equations for the distribution function of elementary excitations and for functions defining a unitary transformation from bare particles to elementary excitations. Application of the theory to the BCS model of superconductivity reproduces the BCS results, and application to a degenerate imperfect Bose gas gives equations which are shown to be equivalent to those of Tolmachev and Wentzel. (Author)

AD-262 995 Div. 25, 15
(15 Sep 61) OTS price $3.60

Brown U. Div. of Applied Mathematics, Providence, R. I.
ON THE FINITE DEFLECTION OF A VISCOELASTIC CANTILEVER,
by T. G. Rogers and E. H. Lee. Aug 61, 31p. incl. illus., 10 refs. (Technical rept. no. 1)
(Contract Nonr-56230, Proj. NR-064-450)
Unclassified report

DESCRIPTORS: *Cantilever beams, *Deflection, Deformation, Elasticity, Stresses, Tensile properties, Measurement, Viscosity, *Applied mathematics, Transformations (Mathematics), Perturbation theory, Mathematical analysis.

A solution is presented for the finite deflection of a linearly viscoelastic cantilever clamped horizontally at one end and loaded vertically at the other. The geometrical nonlinearity is incorporated with the viscoelastic equivalent of the Bernoulli-Euler theory of bending of elastic beams. An example using the viscoelastic properties of a new thermoplastic engineering material, delrin, is presented. The approach uses viscoelastic characteristics in the form of the creep compliance which can be measured directly, and can represent arbitrary linear viscoelastic behavior. The method of solution is presented as an example of the incorporation of linear viscoelastic operators into a perturbation procedure which deals with the influence of geometrical non-linearity. (Author)

AD-263 014 Div. 25
(15 Sep 61) OTS price $4.60

Kane Engineering Labs., Palo Alto, Calif.
INVESTIGATION AND STUDY OF PROPAGATION IN AND PROPERTIES OF NON-UNIFORM PLASMAS.
Quarterly technical note no. 1,
by J. W. Christie. 15 May 61, 46p. incl. illus. 16 refs.
(Contract AF 30(602)2447, Proj. 5561)
(RADC TN 61-137) Unclassified report

DESCRIPTORS: *Plasma physics, *Electromagnetic waves, Wave transmission, Propagation, Physical properties, Mathematical analysis, *Microwaves, High frequency, Low temperature research, Gas ionization, Theory.

Results are presented for the effects on EM wave dispersion due to longitudinal and tranverse plasma distributions. Generally, the effects on plane wave propagation are a decreased dispersion due to longitudinal plasma distributions and an increased dispersion due to transverse plasma distributions. Some results are presented for a simple phenomenological model of plasma conductivity. (Author)

AD-263 048 Div. 25
(18 Sep 61) OTS price $5.60

Brown U. Div. of Applied Mathematics, Providence, R. I.
VISCOELASTIC STRESS ANALYSIS OF A SPINNING HOLLOW CIRCULAR CYLINDER WITH AN ABLATING PRESSURIZED CAVITY,
by A. H. Corneliussen, E. F. Kamowitz and others. July 61, 58p. incl. illus. (Technical rept. no. 5)
(Contract NOrd-18594)
Unclassified report

DESCRIPTORS: *Cylindrical bodies, Structural shells, Rotating structures, Ablation, Viscosity, Elasticity, Deformation, Stresses, Mathematical analysis, Theory.

The viscoelastic stress and deformation analysis of a hollow circular cylinder, spinning about its axis, and subjected to internal pressure on the circular cylindrical ablating cavity is treated. Particular features of this problem: the ablating boundary varying with time, and the centrifugal body force due to spin, introduce difficulties which prevent the direct use

of standard procedures of the theory considered: linear viscoelasticity with infinitesimal deflections. A method involving separate integration with respect to the time and space variables gives the solutions for particular viscoelastic materials represented by models with a finite number of springs and dashpots. A general method of solution is also developed which can be applied to general linear viscoelastic materials characterized by integral operators or the differential operator forms associated with model representation. (Author)

AD-263 054 Div. 25
(18 Sep 61) OTS price $7.60

Institute of Engineering Research, U. of Calif., Berkeley.
LOADING AND UNLOADING SOLUTIONS FOR AN ELASTIC/PLASTIC ANNULAR PLATE IN THE STATE OF PLANE STRESS UNDER COMBINED PRESSURE AND COUPLE,
by R. P. Nordgren and R. M. Naghdi. Apr 61, 70p. incl. illus. 17 refs. (Technical rept. no. 3; Series 130, Issue no. 3)
(Contract DA 04-200-ORD-171)
(AROD 2275:3) Unclassified report

DESCRIPTORS: *Disks, Metal plates, *Mechanics, Elasticity, Plasticity, Plastic flow, Deformation, Hardening, Stresses, Pressure, Shear stresses, Moments, Load distribution, Mathematical analysis, Theory.

A detailed analysis is presented of the axisymmetric deformation of elastic/plastic circular annular plates in the state of plane stress under combined pressure and couple (due to circumferential shear) at the inner boundary. With the use of Tresca's loading function and its associated flow rules, the results obtained include complete elastic/perfectly plastic solutions during both loading and unloading, and complete workhardening solutions during loading with isotropic and with kinematic hardening. The major portion of the paper deals with the unloading problem which requires two new solutions (in addition to the usual elastic unloading solution) in order to cover the full range of load programs including those with one load parameter increasing and the other decreasing. Several novel features of this combined load problem are discussed and illustrated through numerical examples. (Author)

AD-263 061 Div. 25, 8, 17
(18 Sep 61) OTS price $3.60

General Ceramics Div., Indiana General Corp., Keasbey, N. J.
FERRITE DEVELOPMENT.
Quarterly progress rept. no. 4, 15 Feb-15 May 61, on Conduct Research and Development Studies to Develop Magnetic High Frequency Core Materials. 15 May 61, 38p. incl. illus. tables (Rept. no. 47)
(Contract DA 36-039-sc-85234)
Unclassified report

DESCRIPTORS: *Ferrites, *Ferromagnetic materials, Ferromagnetism, Magnetic properties, Iron compounds, Zinc compounds, Manganese compounds, Nickel compounds, Oxides, Cobalt compounds, Additives, Gravimetric analysis, Pyrolysis, Temperature, Stability, Preparation, Heat treatment, Ferrite cores, Magnetic cores, Magnetic susceptibility.

Contents:
High-efficiency Mn-Zn ferrites
Temperature-stable ferrites
Thermogravimetric analysis of the major components of Mn-Zn ferrite
Temperature-stable materials in the 2-12 mc range
Effect of change of the Fe_2O_3-NiO ratio, with and without small additions of Co_2O_3 on the magnetic performance of an Ni-Zn ferrite
Magnetic performance of Ni-Zn ferrites containing MnO with and without the addition of Co_2O_3
Zero-field ferrites - 20 to 70 mc

26. PRODUCTION AND MANAGEMENT

AD-262 379 Div. 26, 27, 14
(18 Sep 61) OTS price $1.60

Naval Ordnance Test Station, China Lake, Calif.
A NEW APPROACH TO PLASTIC-MANDREL FABRICATION,
by Ray A. Miller and Henry T. Sampson. June 61,
16p. incl. illus. tables (NOTS TP 2674)
(NAVWEPS rept. no. 7651) Unclassified report

DESCRIPTORS: Solid rocket propellants, *Plastics, Design, Processing, Thermal conductivity, Silicone resins, Tensile properties, Surface properties, Adhesion, Coatings, Refractory materials, Preparation, Production, Molding, Physical properties, Aluminum, Costs, *Rocket motors, *Rocket cases, *Molding materials, Mechanical properties.

The development of an economical process for fabricating plastic mandrels for use in solid-propellant rocket motors is described. Several types of mandrels were produced from plastic materials for new solid-propellant rocket motors. Tests were performed to determine the shrinkage of the plastic mandrels, tensile strength of various formulations of plastic, surface roughness of plastic mandrels as compared to the master mandrels, thermal conductivities of the plastic formulations, and bond strengths of a silicone-elastomer coating as a mold-release agent on plastic mandrels. Satisfactory mandrels for motors up to 24 in. in diameter and 84 in. in length can be made. Where several mandrels are required, producing plastic mandrels is economically feasible. A method for coating plastic and fabricated aluminum mandrels, not involving the use of any materials leaving a residual grease or wax coating, was developed. (Author)

AD-262 695 Div. 26, 17
(11 Sep 61) OTS price $4.60

Crucible Steel Co. of America, Pittsburgh, Pa.
TITANIUM ALLOY SHEET FLATTENING PROGRAM.
Final technical engineering rept. Aug 58-Dec 60,
by J. L. McKain, M. Feraci, and others.
June 61, 45p. incl. illus. tables.
(Contract AF 33(600)37937)
(ASD TR 61-7-696) Unclassified report

DESCRIPTORS: *Titanium alloys, Sheets, Processing, Manufacturing methods, Heat treatment, Rolling mills, Machines, Design, Effectiveness, Tensile properties, Stresses, Alumium alloys, Molybdenum alloys, Vanadium alloys.

A pilot production model of heat treating equipment for solution treating and flattening titanium alloy sheet was successfully designed, constructed, and evaluated. This concept of flattening has been evaluated and its potential indicated by reducing out-of-flatness in some sheets from the 12 to 17% range to 1 to 2%. The results of this project indicate that this degree of flatness (1 to 2%) can be achieved on the DOD alloys, namely; C-120AV, 115AMoV, 105VA, and 6Mo-3Al. (Author)

AD-262 735 Div. 26, 17, 27
(11 Sep 61) OTS price $4.60

Aerojet-General Corp., Sacramento, Calif.
STUDY OF DIFFUSION BONDING OF TUNGSTEN ALLOYS.
Summary rept. 1 Aug 60-30 June 61.
21 Aug 61, 43p. incl. illus. tables, 30 refs.
(Rept. no. 0433-01Q-1)
(Contract DA 04-200-ORD-1077)
Unclassified report

DESCRIPTORS: Tungsten, *Tungsten alloys, *Diffusion, *Bonding, *Brazing, Soldering alloys, Aluminum, Chromium alloys, Nickel alloys, Palladium alloys, Titanium alloys, Bonded joints, Melting, Mechanical properties, Shear stresses, Sheets, Rocket motor nozzles, Tests, Laminates.

Efforts to develop diffusion-bonding techniques for bonding W laminates for rocket motor nozzles are summarized. A study was made to determine the relationship of temperature, pressure, and material thickness in blanking of W sheet. The force required increased linearly with blank diameter and material thickness. A study of diffusion bonding was made of commercially pure W with Al, Cr-Ni, Cr-Pd, Ti-Ni, Ti-Ni-Cr and 4 commercial braze alloys. Diffusion treatments following brazing consisted of 1950 F for 4 hr, 1950 F for 19 hr, 2100 F for 3.5 hr, and 2250 F for 2 hr. Good joints were obtained with all braze alloys except Al and Ti-Ni-Cr mixtures. Remelt temperatures were determined for brazed and diffused joints; the lower-temperature diffusion treatment (1950 F for 4 hr) gave as high or higher remelt temperatures for each alloy than a higher-temperature diffusion treatment. Double-lap shear-strength specimens were prepared from each of the 4 commercial braze alloys which were used to fabricate nozzle liners for tests under firing conditions (4900 F flame temperature, 750-psia chamber pressure, 60-sec duration).

AD-262 901 Div. 26, 17
(14 Sep 61) OTS price $8.10

Crucible Steel Co. of America, Midland, Pa.
THE DEVELOPMENT OF OPTIMUM MANUFACTURING METHODS FOR COLUMBIUM ALLOY FORGINGS.
Interim technical engineering rept. no. 5,
15 Mar-15 Aug 61,
by R. O. Carson. Aug 61, 88p. incl. illus. tables.
(Contract AF 33(600)39944, Proj. 7-782)
(ASD TR 7-782, vol. 5)
Unclassified report

DESCRIPTORS: *Niobium alloys, Forging, Manufacturing methods, Processing, Melting, Electric arcs, Electron beams, Vacuum furnaces, Electrodes, Microstructure, Porosity, Physical properties, Chemical analysis, Tests.

Of the four alloys evaluated, F48 (Cb-15W-5Mo-1Zr), Cb74 (Cb-10W-5Zr), D41 (Cb-20W-10Ti-6Mo) and D31 (Cb-10Ti-10Mo), alloy Cb74 offers the best combination of hot strength, ductility and forgeability for the production of closed die forgings. Good quality extrusions were made at 2200-2300 F from ingots of the four alloys which had been canned in mild steel. Upset forging tests were made on annealed pieces of the extrusions at three temperatures using 50% upset in one heat and 75% upset in two heats. In summary, alloy Cb74 was best. Shortcomings of other alloys were: D31 -- lowest hot strength, D41 -- shallow forging cracks, room temperature brittleness, low hot strength, F48 -- slight forging cracks from the lower temperatures, low ductility as annealed though considerably improved by 1400 F vacuum anneal. Oxidation resistance com-

parisons varied widely between alloys depending on temperature, all need coatings. An advantage for F48 was appreciably higher hot strength. Stress rupture strength in range 2000-2600 F was 50% higher than for Cb74. (Author)

AD-262 905 Div. 26, 17
(14 Sep 61) OTS price $.50

Defense Metals Information Center, Columbus, Ohio.
REVIEW OF RECENT DEVELOPMENTS IN METALS JOINING.
Rept. for 30 Apr-20 July 61,
by J. J. Vagi, W. J. Lepkowski and others.
1 Sep 61, 5p. incl. table. (DMIC Memo. no. 125)
Unclassified report

DESCRIPTORS: *Heat resistant alloys, *Niobium alloys, *Refractory materials, Welding, Welded joints, Arc welds, Spot welds, Plasma jets, Electron beams, *Sheets, Metal joints, Steel, Titanium alloys, Molybdenum, Stainless steel, Explosives, *Electric welding, Electric conductance, Slags, *Nickel alloys, Bonded joints, Adhesives, Ceramic materials, Bonding.

Contents:
Metals Joining
Materials
Refractory metals
Plasma welding of refractory metals
Processes
Explosive welding
Electroslag welding equipment
Adhesive bonding

AD-262 919 Div. 26, 17, 12
(14 Sep 61) OTS price $1.10

Lodge and Shipley Co., Cincinnati, Ohio.
MAGNESIUM ALLOY AIRFRAME.
Monthly progress rept. no. 5, 1-30 June 61,
by R. O. Sweeney and J. A. Warnken. 12 July 61, 4p.
(Contract DA 33-008-ORD-2084)
Unclassified report

DESCRIPTORS: *Airframes, *Magnesium alloys, Configuration, Conical bodies, Metal plates, Design, Processing, Production, Manufacturing methods, Machining.

AD-262 955 Div. 26, 17
(14 Sep 61) OTS price $.75

Watertown Arsenal Labs., Mass.
COLD ROLLING OF HIGH-STRENGTH STEEL STRIP.
Rept. on Research of Materials for High Temperature Use,
by Eugene Di Cesare. June 61, 22p. incl. illus. table (Technical rept. no. WAL TR 320.1/4)
Unclassified report

DESCRIPTORS: *Steel, *Sheets, *Rolling mills, Processing, Production, Design, Heat treatment, Tensile properties, Mechanical properties.

SAE 4340 and Tricent steel test specimens 1-in. wide by 1/8-in. thick were heat treated to 4 tensile strength levels, 153,000, 213,000, 267,000, and 307,000 psi, and rolled on a 2-high experimental rolling mill. Rolling speed was 30 surface fpm and temperatures ranged from room temperature to 1150 F with reductions of 5% through 57% in one pass. Roll separating force, torque, and forward slip data were obtained experimentally and specific pressure, work, forward slip, lever arm ratio, and spread were calculated. Roll separating force, specific pressure, and horsepower increased with reduction and specimen strength level. The effect of rolling temperatures on the roll separating force was negligible when rolling below 1150 F; however, when rolling at 1150 F the roll separating force and specific pressure decreased. (Author)

AD-263 030 Div. 26
(18 Sep 61) OTS price $3.60

Committee on Ship Structure, National Research Council, Washington, D. C.
THE FEASIBILITY OF X-RAY INSPECTION OF WELDS USING BACK SCATTERED RADIATION,
Final rept.,
by E. L. Criscuolo, C. H. Dyer, and D. P. Case.
28 July 61, 26p. incl. illus. tables (Serial no. SSC-132)
(In cooperation with Naval Ordnance Lab., White Oak, Silver Spring, Md.)
Unclassified report

DESCRIPTORS: *Welds, Welded joints, Nondestructive testing, Metal plates, Ship plates, Steel, *Radiography, Radiographic analysis, X-ray photography, Gamma rays, Feasibility studies, X rays, Sources, Reflection, Scattering, Attenuation, Intensity, Sensitivity, Measurement, Isotopes, Scintillation counters, Optical systems, Cameras, Design.

Theoretical and experimental work was conducted to develop a radiographic flaw detection technique using source and film located on the same side of the plate. In view of a serious limitation on the depth at which discontinuities in steel can be detected (0.20 in.) and long exposure time (20 min. at 250 kv), the method is considered to be unsatisfactory as a critical inspection tool. (Author)

27. PROPULSION SYSTEMS

AD-262 530 Div. 27, 12
(6 Sep 61) OTS price $1.10

Goodrich, B. F., Co., Akron, Ohio.
AFT-ENDCLOSURE STUDY FOR POLARIS A-3 ROCKET MOTOR CASE.
Progress rept. no. 1, 26 May-26 June 61,
by H. W. Stevenson and R. A. Harrington.
11 July 61, 9p. incl. illus.
(Contract NOw 61-0499-c)
Unclassified report

DESCRIPTORS: *Rocket cases, Design, Structures, Mathematical analysis, Filament wound construction, Glass textiles, Resins, Structural shells, Aluminum alloys, Metal plastic adhesives, Bonding, Model tests, Hydrostatic pressure, Reinforcing materials, Laminates, Exhaust nozzles, Rocket motor nozzles, Stresses, Manufacturing methods, Staging, Combustion chambers, Guided missiles, Surface to surface, Underwater to surface, Rubber adhesives, Rubber seals, Solid rocket propellants, Metal glass adhesives.

Design studies were begun of the aft dome section of the Polaris A-3 rocket motor case with the following objectives: (1) analyze the magnitude of stresses and stress distribution around the port openings; (2) determine structural requirements for port reinforcement and design optimum reinforcement for the stress pattern; (3) investigate use of a more ductile type of Al alloy for aft cluster fitting; (4) analyze shape of aft cluster and recommend shape which will reduce bending stress under pressure to a minimum; and (5) develop optimum flexible bond between Al cluster fitting and fiber glass chamber. Theoretical computations were made of stresses at port openings. (Author)

AD-262 531 Div. 27, 12, 14
(7 Sep 61) OTS price $1.10

High Temperature Materials, Inc., Boston, Mass.
PYROLYTIC CARBIDE DEVELOPMENT PROGRAM.
Monthly progress rept. no. 16, 1-31 July 61.
31 July 61, 5p. incl. illus. table.
(Contract NOw 60-0292)
Unclassified report

DESCRIPTORS: *Carbides, *Rocket motor nozzles, Niobium compounds, Hafnium compounds, Tantalum compounds, Coatings, Materials, Pyrolysis, *Refractory coatings, Refractory materials, Processing, Test equipment.

Two tantalum carbide coated ARC nozzles were produced. A table of the nozzles and and the progress made in their evaluation are presented. One tantalum carbide coated nozzle was tested in ARC firing M-277 but no useful data were obtained. The best firing results to date were obtained with a niobium carbide coated nozzle. The pressure trace indicated no erosion for 27 seconds, at which time a portion of the exit cone was removed. (Author)

AD-262 606 Div. 27, 30
(7 Sep 61) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
THE POSSIBILITY OF USING BINARY MIXTURES FOR THE MODEL TESTING OF TURBINES,
by V. M. Tyugin. 4 Aug 61, 18p. incl. illus.
(Trans. no. MCL-1040 of Aviatsionnyy Institut, Trudy 119, Moscow, pp. 162-173)
Unclassified report

DESCRIPTORS: *Turbines, Axial flow turbines, Centrifugal compressors, Model tests, Test methods, *Test facilities, Mixtures, Gases, Gas flow, Diffusion, Argon, Carbon tetrachloride, Molecular weight, Centrifuge separation, Mathematical analysis, *Gas turbines, Combustion chamber gases, Simulation, Feasibility studies, Translations.

The simulation of combustion gases by a binary mixture of a high molecular weight gas (46%CCl4) and a rare gas (54% Ar) in the model testing of gas turbines is discussed. The degree of stratification on the working blades and the thermodynamic equilibrium of the expansion of such mixtures are analyzed by means of a mathematical model. It was concluded that the use of binary mixtures of gases for model testing of turbines was valid.

AD-262 607 Div. 27
(7 Sep 61) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
EFFECT OF THE RADIAL CLEARANCE ON THE OPERATION OF A CENTRIPETAL GAS TURBINE,
by A. P. Tunakov. 4 Aug 61, 16p. incl. illus.
(Trans. no. MCL-1041 of Izvestiya Vysshikh Uchebnykh, Zavedeniy Aviatsionnaya Tekhnika 4:83-92, 1960)
Unclassified report

DESCRIPTORS: Technological intelligence, USSR, Translations, *Gas turbines, Guide vanes, Tests, Erosion, Design.

The following conclusions were drawn: (1) Small radial clearances are not desirable because of the reduction in efficiency, the increased noise level, and the possibility of erosion of the guide vanes during operation with gas containing dust; (2) Considerable increase in the radial clearance does not cuase a decrease in the efficiency of the turbine; (3) The optimum clearance can be determined approximately from a graph; (4) The degree of reactivity and the gas consumption in the turbine are practically independent of the radial clearance, if the angle alpha sub 1 (the outlet angle of the flow from the guide vane assembly) remains constant; and (5) An effective means of combating erosion of the guide vanes is to increase the radial clearance. (Author)

AD-262 615 Div. 27, 20
(8 Sep 61) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
BRIEF COMMUNICATIONS.
8 Aug 61, 5p. (Trans. no. MCL-1130 of Atomnaya Energiya 9:347-348, 1960)
Unclassified report

DESCRIPTORS: Rods, Metal plates, Containers, *Gas turbines, Pipes, Steam pipes, Thermal radiation, Deformation, Research reactors, *Atomic energy engineering, Sources, Accelerators, Uranium, USSR, Heat transfer, Thermal stresses.

AD-262 775 Div. 27, 26
(13 Sep 61) OTS price $6.60

General Telephone and Electronics Labs., Inc., Bayside, N. Y.
DEVELOPMENT OF COMPOSITE ROCKET NOZZLES.
Final rept.,
by Irving Strauss. 31 Aug 61, 63p. incl. illus. tables, 12 refs. (Rept. no. TR 61-109.8)
(Contract NOw 61-0479-c)
Unclassified report

DESCRIPTORS: Nozzles, *Rocket motor nozzles, Carbides, Tungsten wire, Tantalum compounds, Zirconium compounds, Tests, Refractory materials, Materials, Test methods, Processing, *Flame spraying, Heat treatment, *Manufacturing methods.

A material for rocket nozzles, consisting of a tantalum carbide matrix with embedded reinforcing tungsten wires, has been developed. The fabrication method is such that reactions between carbide and tungsten wires were prevented and the tungsten wires retained their ductility at room

temperature. Plasma-flame spraying is used for the deposition of the carbide matrix. After a discussion of the general reinforcement effect produced by ductile wires in a brittle matrix, the advantages and disadvantages of a number of wire frameworks and refractory matrix materials are outlined. Tantalum carbide was selected as the main matrix material to be studied because of its extremely high melting point. A wire structure, consisting of circumferential windings supported and kept in place by longitudinal coils, was considered to be the optimum configuration for reinforcing a rocket nozzle. A method was developed to spray carbides in an inert atmosphere chamber. This kept the carbon content of the material close to the theoretical amount, but the deposition of a fully stoichiometric carbide proved not to be feasible. A number of tensile and other tests were performed to investigate the effectiveness of reinforcing structures. (Author)

AD-262 888 Div. 27
(14 Sep 61) OTS price $4.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
EFFECTS OF DIFFUSER LENGTH ON THE PERFORMANCE OF EJECTORS WITHOUT INDUCED FLOW,
by R. C. German and R. C. Bauer. Aug 61, 43p. incl. illus. tables (AEDC TN-61-89)
(Contract AF 40(600)800, Proj. 100928)
Unclassified report

DESCRIPTORS: *Exhaust gas ejectors, Conical nozzles, Exhaust nozzles, Supersonic nozzles, Supersonic diffusers, *Exhaust diffusers, Configuration.

An investigation of ejectors without induced flow was made to determine the effects of varying diffuser lengths on ejector performance. Four 18-deg half angle conical nozzles having constant exit diameters and different throat diameters and two contoured nozzles having zero-deg half angles at the exit were used as the ejector driving nozzles. Unheated air was used for all tests. The diffuser length-to-diameter ratios were varied between 0.7 and 21.5, and three cylindrical ducts of different diameters were used both with and without a subsonic diffuser. An empirical method was developed to estimate the starting and operating pressure ratios of such ejector configurations using simple-determined one-dimensional normal shock relationships. (Author)

AD-262 986 Div. 27, 14
(15 Sep 61) OTS price $6.60

Atlantic Research Corp., Alexandria, Va.
DEVELOPMENT OF FLEXIBLE POLYMERS AS THERMAL INSULATION IN SOLID-PROPELLANT ROCKET MOTORS.
Annual Summary rept. no. 1, 24 June 60-24 June 61, by N. Vasileff, T. Walton and others. 24 July 61, 61p. incl. illus. tables.
(Contract DA-36-034-ORD-3325-RD)
Unclassified report

DESCRIPTORS: Solid rocket propellants, Rocket motors, *Combustion chamber liners, Thermal insulation, *Insulating materials, Resins, Epoxy resins, Polymers, Furans, Esters, Amines, Urethanes, Epoxides, Amides, Physical properties, Mechanical properties, Combustion, Phenolic resins, Heat resistant polymers.

Flexible epoxy, phenolic, and melamine resins have been prepared. Tensile strength and per cent elongation have been determined on some of these asbestos-filled and unfilled materials. Many of the epoxy formulations have been evaluated as insulators by the oxyacetylene torch and by actual motor firing, while several of the phenolic modifications have been evaluated in the arc-image furnace and are currently undergoing oxyacetylene torch and motor firing testing. Three epoxies with the best performances are Epon 828-Nadic methyl anhydride modified with 30% of castor oil, Epon 828 modified with EM-206, and Epon 815 modified with XR 2000. Test results from the arc-image furnace indicate that some phenolic-Syl Kem formulations are very promising. (Author)

AD-263 013 Div. 27
(18 Sep 61) OTS price $1.60

Kidde Aero-Space Div., Walter Kidde and Co., Inc., Clifton, N. J.
FIBERGLASS MOTOR CASE STUDY.
Progress rept., 1-31 Aug 61,
by T. Siuta. 1 Sep 61, 11p. incl. illus. table.
(Rept. no. 3642-5)
Unclassified report

DESCRIPTORS: Rocket motors, *Rocket cases, Design, *Model tests, Tests, *Rocket closure cups, Failure (Mechanics), Deflection, Glass textiles, Cylinder liners, Rubber coatings.

A study was made to determine the deflection characteristics of various dome closure contours under internal pressurization of rocket cases. Fabrication and test of models using the determined zero shear contour is discussed. Procurement of dipped rubber liners was secured for the contour test. Inspection of recent dome failures and the determination of factors effecting the design of a suitable scale model rocket case is described. (Author)

AD-263 049 Div. 27, 25
(18 Sep 61) OTS price $1.60

Brown U. Div. of Applied Mathematics, Providence, R. I.
AN APPROACH TO THE INHIBITION OF FRACTURING IN ENCASED SOLID PROPELLANT GRAINS,
by E. H. Lee. July 61, 17p. incl. illus. (Technical rept. no. 4)
(Contract NOrd-18594)
Unclassified report

DESCRIPTORS: *Rocket cases, *Solid rocket propellants, Propellant grains, Viscosity, Elasticity, Fracture (Mechanics), Inhibition, *Cylindrical bodies, Structural shells, Hydrostatic pressure, Stresses, Load distribution, Mathematical analysis, Design, Pressure.

The variation of the stress distribution in a hollow circular cylinder of viscoelastic material encased in an elastic reinforcing shell and subjected to internal pressure is assessed from the standpoint of design of a solid propellant rocket grain. It is shown that through maintained internal pressure the anelastic property of the material permits the build-up of a residual stress system comprising compressive stresses throughout the cylinder without producing appreciable hoop tension in it at any time during the loading history. Such a stress field will inhibit the initiation and growth of fracture cracks. It could be effective throughout the curing process to prevent cracking during shrinkage, and retain its influence during firing. Such a stress field

is associated with increased hoop tension in the reinforcing shell, but this could presumably be supported independently during the curing and storage period. (Author)

AD-263 082 Div. 27, 9
(18 Sep 61) OTS price $1.00

National Aeronautics and Space Administration, Washington, D. C.
ANNULAR INTERNAL-EXTERNAL-EXPANSION ROCKET NOZZLES FOR LARGE BOOSTER APPLICATIONS,
by James F. Connors, Robert W. Cubbison, and Glenn A. Mitchell. Sep 61, 31p. incl. illus.
(NASA Technical note no. D-1049)
Unclassified report

DESCRIPTORS: *Rocket motor nozzles, Configuration, Design, Exhaust gases, Deflection, Thrust, Control systems, *Test facilities, Supersonic wind tunnels, Simulation, Compressed air, Aerodynamics, Gas flow, Subsonic flow, Transonic flow, Supersonic flow, Tests, Measurement, Booster rockets, Rocket motors, Liquid rocket propellants, Determination.

Annular nozzles with area ratios of 15 and 25 with free-stream airflow through the center as well as around the outside of the exiting jet were investigated in quiescent air and at Mach 2 and 3. Over a pressure-ratio range of 40 to 1000, the ratio of actual to ideal thrust was constant at approximately 0.98. Compared with conventional convergent-divergent nozzles, the performance of the annular internal-external expansion nozzle for representative boost missions could yield significant orbital payload increases. A single flap on the external-expansion surface of the 25:1 annular nozzle produced a side force equal to 4% of the axial force with no measurable loss in axial thrust. (Author)

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-262 360 Div. 28, 16
(29 Aug 61) OTS price $1.10

Stockholm U. (Sweden).
SCALES FOR SUBJECTIVE DISTANCE.
by Theodor Kunnapas. 1 Nov 60, 8p. incl. table, 13 refs. (Technical (Scientific) note no. 4)
(Contract AF 61(052)300)
(AFOSR-739) Unclassified report

DESCRIPTORS: *Space perception, Mathematical analysis, *Psychology, Stimulation, Measurement.

Scale values were obtained for subjective distance by means of the method of ratio estimation. In three experiments different stimulus ranges of the objective distances were used. It was found that: (1) Subjective distance is a power function of the objective distance; and (2) The exponent of the function varies with the stimulus range. (Author)

AD-262 433 Div. 28
(5 Sep 61) OTS price $2.60

Michigan U., Ann Arbor.
PROBLEMS OF RESPONSE CONTAMINATION IN PERSONALITY ASSESSMENT,
by Warren T. Norman. May 61, 18p. 39 refs.
(Contract AF 41(657)269, Proj. 7717)
(ASD TN 61-43) Unclassified report

DESCRIPTORS: *Personality, *Personality tests, Test methods, Psychometrics, Measurement, Design.

This survey reports the first phase of a project to develop tests to measure five personality variables. Various techniques are defined and these are appraised on the basis of logical implications and empirical findings. Conclusions favored questionnaires composed of forced-choice self-report items as best suited to the purpose of the project. A program is outlined for construction of such tests to produce instruments valid for the selected criterion variable and free from appreciable biasing effects. (Author)

AD-262 498 Div. 28
(6 Sep 61) OTS price $9.10

Douglas Aircraft Co., Inc., El Segundo, Calif.
HUMAN FACTORS FOR ARMY-NAVY INSTRUMENTATION PROGRAM.
Summary rept. and planning document.
4 Aug 61, 101p. incl. illus. (Rept. no. ES 40394)
(Contract Nonr-107600)
Unclassified report

DESCRIPTORS: *Human engineering, Instrumentation, Display systems, Flight, *Flight simulators, Analysis, Test equipment, Research program administration, Data processing systems, Flight testing, Control systems, Television equipment.

This document reviews the terms of reference, the premises and the progress of the Human Factors aspects of the Army-Navy Instrument Program as controlled by the Douglas Aircraft Company and reports achievements gained elsewhere both within and outside the program. Proposed areas and priorities for additional research and application are also included. (Author)

AD-262 533 Div. 28
(7 Sep 61) OTS price $10.50

Institute for Psychological Research, Tufts U., Medford, Mass.
LITERATURE SURVEY ON HUMAN FACTORS IN VISUAL DISPLAYS,
by Philip B. Sampson, Edward A. Wade and others.
June 61, 135p. 154 refs.
(Contract AF 30(602)2358, Proj. 5577)
(RADC TR 61-95) Unclassified report

DESCRIPTORS: *Human engineering, *Display systems, Design, *Bibliography, Information theory, Communications theory, Perception, Visual perception, Auditory perception.

The ability of the human operator to assimilate, process, and use information presented visually, is an important factor in the design of visual displays. This report, which takes the form of an annotated bibliography, was prepared to access the current state of knowledge on this topic. The annotations are organized under four major

headings which are: (1) Information Load and Speed, (2) Display Format and Content, (3) Display Integration, and (4) Human Complex Processes as Related to Displays. Under these headings, reports dealing with a variety of sub-topics such as search and detection of visual targets, recognition and interpretation of display elements, human information processing and channel capacity, signal presentation rate, coding, S-R compatibility, and decision making are to be found. Each of the four parts contains introductory text which analyzes and evaluates the annotations contained in the part. (Author)

AD-262 581 Div. 28
(6 Sep 61) OTS price $1.60

School of Aerospace Medicine, Brooks Air Force Base, Tex.
CREW INTERACTION DURING A THIRTY-DAY SIMULATED SPACE FLIGHT. PRELIMINARY STUDY,
by Douglas H. Hagen. June 61, 9p. incl. illus. tables (Rept. no. 61-66)
Unclassified report

DESCRIPTORS: *Aviation personnel, Space capsules, *Space flight, Simulation, Psychomotor tests, Behavior, Analysis, Human engineering, Personality, Adjustment (Psychology).

An analysis was made of crew interaction during a two-man simulated space chamber flight. By use of the well-known Bales Interaction Process Analysis, the behavior of the two subjects was rated during 2 hours of observation each day throughout the 30-day flight. Four kinds of summary interaction profiles were compiled. The over-all summary profile resembled no other in the literature. The middle categories--asking for opinion, giving opinion, asking for information, and giving information--accounted for over 80 percent of the interaction. There was very little interaction in the more affectively tinged extreme categories. The adjustive mechanisms used by the subjects to handle the interpersonal tensions that arose from somewhat different personality factors were discussed. (Author)

AD-262 600 Div. 28
(7 Sep 61) OTS price $9.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
THE INFLUENCE OF EXPERIENCE ON THE PERCEPTION OF SHAPES. II. COMPARATIVE RESEARCH CONCERNING THE SHAPE IMPRESSION EFFECT AND THE INFLUENCE OF SPECIFIC COURSE OF EVENTS ON THE INTERPRETATION OF OPTICAL COMPLEXES,
by Kurt Gottschaldt. 29 June 61, 116p. incl. illus. tables (Trans. no. MCL-645 of Aus dem Psychologischen Institut der Universitat Berlin 12: 87p., 1929)
Unclassified report

DESCRIPTORS: *Visual perception, Visibility, Space perception, *Perception, Theory, Optical images.

Contents:
Experiments with shapes of very simple Gestalt union
Experiments on figures formed in the threshold area
Experiments on shape-basic-structures
On the theory of experience

AD-262 742 Div. 28
(12 Sep 61) OTS price $1.60

American Inst., for Research, Pittsburgh, Pa.
DECREMENTAL EFFECTS OF REINFORCEMENT IN TEAMS WITH REDUNDANT MEMBERS,
by Karl Egerman, David J. Klaus, and Robert Glaser. 2 Sep 61, 17p. incl. illus.
(Sponsored by the Office of Naval Research)
Unclassified report

Paper presented at the meetings of The American Psychological Association, 2 September 1961.

DESCRIPTORS: *Group Dynamics, *Training, *Behavior, Stimulation, Tests.

This study was undertaken to support the theory that the addition of an extra member to a team will enhance that team's performance. In the teams studied, however, this effect was maintained only temporarily, and with continued practice, five of the six teams showed a decided performance decrement, falling to a level which was at least 33% below that of either of the original two-man components. This decrement was explained by the reinforcement contingencies present in the situation which permitted a redundant member to be reinforced for inappropriate performance even though the performance of the team was correct. The results of this study indicate that, in spite of a possible increment in initial team output, redundant teams under the conditions investigated were showing an eventual performance decrement. (Author)

AD-262 771 Div. 28, 8
(12 Sep 61) OTS price $8.60

Human Resources Research Office, George Washington U., Washington, D. C.
A PROCEDURAL GUIDE FOR TECHNICAL IMPLEMENTATION OF THE FORECAST METHODS OF TASK AND SKILL ANALYSIS,
by Edgar L. Shriver, C. Dennis Fink, and Robert C. Trexler. July 61, 92p. incl. illus. tables.
Unclassified report

DESCRIPTORS: *Job analysis, Electronic systems, *Handbooks, Training, Weapons, *Electronics, Maintenance, Analysis, Tests, Personnel, Guided missiles, Human engineering.

The methods of task and skill analysis are described in this procedural guide. FORECAST is directed toward developing means for accurate forecasting the training demands imposed by new electronic weapon systems. Methods for forecasting training needs for a guided missile system were constructed and experiments were performed. The system of analysis was modified and refined in FORECAST II, in which transfer of training, increased proficiency, and equipment-minimizing effects of the method were studied. A study of the application of the FORECAST concepts to equipment other than that on which the methods were developed was also conducted; and these procedures have now been incorporated in the IMPROVED NIKE HERCULES HIPAR course. It is believed that the procedures described herein can serve as a basis for further implementation or development of this type of analysis by personnel working in this technical field. (Author)

AD-263 091 Div. 28, 32
(15 Sep 61) OTS price $15.00

Pennsylvania State U., University Park.
BARGAINING BEHAVIOR: I. THE USES OF INFORMATION AND THREAT BY BILATERAL MONOPOLISTS OF UNEQUAL

STRENGTH,
by Lawrence E. Fouraker, Sidney Siegel, and Donald L. Harnett. May 61, 225p. incl. illus. tables.
(Grants NSF-G16423 and Nonr-G00012)
Unclassified report

DESCRIPTORS: *Reasoning, *Economics, Economic conditions, *Group dynamics, Industrial relations, Applied psychology.

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-262 670 Div. 29, 20, 16
(8 Sep 61) OTS price $2.60

Quaker Oats Co., Barrington, Ill.
USE OF VARIOUS AMOUNTS OF RADIATION AND HEAT PROCESSING IN THE PRESERVATION OF CANNED FOODS.
Progress rept. no. 16. (Final) 8 July 55-31 Dec 60.
31 Dec 60, 24p. incl. illus. tables (Rept. no. S-704)
(Proj. 7-84-01-002)
Unclassified report

DESCRIPTORS: *Food, Processing, Preservation, *Radiation effects, Heating, Dose rate, *Cereals, Electron beams, Gamma rays, Acceptability, Dosimeters, Bacteria, Spores, Measurement, Viability.

There appeared to be no advantage in irradiation preservation of any of the food products investigated under this contract. While there was only a slight flavor change in oats irradiated with 930,000 rads, the irradiation did not result in improvement of the keeping quality of the product. A shortened heat process appeared to be less desirable for chili than for foods such as fruits and vegetables which in themselves have a characteristic flavor. Chili flavor is enhanced by the blending of spices during cooking, and the taste panel results indicated that the longer retort process was preferable to a short process used either alone or with irradiation. There was thus no advantage to a shortened retort period for this product. The measurement of dose and pattern of dose distribution by biological means as a supplement to physical or chemical dosimeters has shown some promise, and more work on this is planned under a subsequent contract. One of the problems encountered with these experiments was the limited amount of radiation which could be used. The range of accuracy of the cobalt glass dosimeters was higher than the radiation tolerance of the particular organism used. It is hoped that with more radiation resistant organisms a greater range of radiation dosage can be measured by biological means. (Author)

AD-262 744 Div. 29, 20
(12 Sep 61) OTS price $1.60

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.
RADIATION AND STERILIZATION OF FOODS,
by F. D. Maurer and M. A. Koss. 15 Mar 61, 13p. incl. tables.
(In cooperation with Georgia Coastal Plains Experiment Station, Tifton)
Unclassified report

DESCRIPTORS: *Laboratory animals, *Feeding, Food, Preservation, *Radiation effects, Medical examination, Pathology, Thyroid gland, Experimental data.

This report of findings, in the material received from Georgia Coastal Plains Experiment Station, is one of a series of preliminary reports to be prepared by the Armed Forces Institute of Pathology. The diet fed to the dogs on this experiment included irradiated bacon or cabbage. The materials received were complete and well prepared. The pathologists' reports were fully completed and pathologic conditions adequately described. There is no evidence noted from the review of this material that the consumption of irradiated bacon or cabbage, by dogs, produced any histopathologic change that can be attributed to the specific food or level or irradiation. Lymphocytic thyroiditis was the most unusual finding. The condition was noted in both feeding programs and in all experimental diet groups including controls. Further investigation of this type lesion in other dog feeding programs will be made. (Author)

AD-262 761 Div. 29, 20, 16
(12 Sep 61) OTS price $1.10

Cornell U., Ithaca, N. Y.
COMPONENTS OF IONIZED IRRADIATED MEATS INJURIOUS TO REPRODUCTION.
Progress rept. no. 1,
by C. M. McCay and G. L. Rumsey. 15 Mar 61, 3p. incl. table.
(Contract DA 49-007-md-600)
Unclassified report

DESCRIPTORS: *Food, *Radiation effects, Laboratory animals, Nutrition, Diet, Growth, Genetics, Electron beams.

All dogs on the experiment were parasite-free at the time of writing this report. The dogs on this experiment are growing and maturing faster than usual compared with our kennel normals. This is probably attributable to the superior nutritive value and high acceptability of this ration. (Author)

AD-262 810 Div. 29, 20, 16
(12 Sep 61) OTS price $1.60

Oregon State Coll. Agricultural Experiment Station, Corvallis.
THE GROWTH, BREEDING, LONGEVITY AND HISTOPATHOLOGY OF RATS FED IRRADIATED OR CONTROL FOODS.
Summary rept. on Room Temperature Stored Irradiated Jam,
by Edward C. Bubl, Ian J. Tinsley and others.
3 Jan 61, 15p. incl. illus. tables.
(Contract DA 49-007-md-580)
Unclassified report

DESCRIPTORS: *Food, *Radiation effects, Laboratory animals, Nutrition, Growth, Genetics, Hematology.

Rations containing 35% dry solids of control or irradiated (2.79 or 5.58 megarad) jam have been fed to four generations of rats. Statistical analysis of the data revealed no treatment effects with respect to growth, breeding, longevity or hematology. It is of interest that the analyses of the longevity data indicated that on the jam ration the female animals lived for a longer period than the males. (Author)

AD-262 880 Div. 29, 16, 1
(14 Sep 61) OTS price $4.60

Army Board for Aviation Accident Research, Fort Rucker, Ala.
ARMY AVIATION HELMET EXPERIENCE.
1961, 41p. incl. tables (Rept. no. HF 4-61)
Unclassified report

DESCRIPTORS: *Helmets, Aviation accidents, Aviation injuries, *Protective clothing, Tests, Accidents, Safety devices, Reliability, Aviation personnel, Military personnel.

The purpose of this research was to determine the effectiveness of hard shell helmets for preventing loss of life and injuries during Army aircraft accidents and to summarize comments on helmets in current use. The wearing of hard shell helmets was credited with prevention of head injuries to 265 occupants of Army aircraft during the period studied. Factors of convenience and comfort, particularly heat retaining qualities, constitute major objections to wearing the APH-5 helmet. (Author)

AD-263 011 Div. 29, 31, 26
(18 Sep 61) OTS price $8.60

Ingersoll Research Center, Borg-Warner Corp., Des Plaines, Ill.
SUBMARINE FOOD STORAGE PROJECT.
Rept. on Phase 1,
by B. M. Jaremus, R. L. Kuehner and W. Scholten.
1 Sep 60, 92p. incl. illus. tables (Rept. no. R-3230)
(Contract NObs-78356)
Unclassified report

DESCRIPTORS: *Food, *Storage, Preservation, Processing, Test methods, Dehydration, Controlled atmospheres, Ionization, Antibiotics, Freeze drying, *Submarines, Refrigeration systems, Thermoelectricity, Power supplies, Control systems, Packaging.

A study of present food preservation and storage practices are made. An extensive investigation of new food preservation methods revealed that the Freeze De-Hydration process will have an effect on the Chill, Freeze, and Dry Stores distribution by 1965. Revised food storage tables were developed. In food storage refrigeration, thermoelectricity is presented or the possibility for complete silent refrigeration. A preliminary study of the application of thermoelectricity was made. Studies of methods of packing and storing reveal that much can be done to insure efficient utilization of the food storage space. (Author)

30. RESEARCH AND RESEARCH EQUIPMENT

AD-262 301 Div. 30
(1 Sep 61) OTS price $2.60

Mississippi State U., State College.
AN ELECTRONIC DIFFERENTIAL PRESSURE INDICATOR FOR STATIC MEASUREMENT OF GASEOUS FLUID FLOW.
Master's thesis,
by Jessie H. Coon. 1 Aug 61, 20p. incl. illus.
(Research rept. no. 34)
(Contract Nonr-97801)
Unclassified report

DESCRIPTORS: *Pressure gages, *Gas flow, *Electronic equipment, Measurement, Meters, Calibration, Theses, Velocity, Transformers, Oscillators, Transistors, Instrumentation, Test equipment, Temperature.

In constructing the Electronic Differential Pressure Indicator, components which were commercially available were used as much as possible. It was necessary, however, to construct a number of the components such as the input transformer and the oscillator transformer. In addition, both the printed wiring board and the instrument panel overlay had to be designed and constructed. The device has been useful in measuring pressure differentials and velocities which are of low magnitude and has found additional use in determining directions of low velocity flows with the use of directional probes. The frequency response of the Electronic Differential Pressure Indicator is limited by the diaphragm and connecting tubes. It is sufficiently high to suggest the construction of an oscillator with a capacitance microphone in the tank circuit, for frequency measurements of air flow to investigate turbulence and flow separation. It is for this reason that provisions were made for an external input and an audio output in the construction of the Electronic Differential Pressure Indicator. (Author)

AD-262 303 Div. 30
(1 Sep 61) OTS price $1.60

Mauch Labs., Inc., Dayton, Ohio.
THE DEVELOPMENT OF A READING MACHINE FOR THE BLIND.
Summary rept. 1 July 60-30 June 61,
by Walter G. Nolte and Hans A. Mauch. 30 June 61, 11p.
(Contract V1005M-1943)
Unclassified report

DESCRIPTORS: *Reading machines, Blindness, Test equipment, Design, Coding.

Work has been directed toward the solution of detail problems in refining the prototype models. A word synthesizer has been completed and fully equipped with magnetic tape fragments containing pre-recorded spelled-speech letters developed by Professor M. Metfessel of the University of Southern California. This prototype model can compose whole words up to 15 letters long and read them out at rates up to 8 letters per second. Continued work on the scanning array of photocells has resulted in an arrangement which will recognize all the lower case letters of the alphabet. It also appears possible to extend the recognition capability of this array, by certain modifications, to include capital letters, numerals, and selected symbols. Logic matrices have been developed to decode the photosignals from the scanning array and convert them into a 5-bit code which then controls the output of synthesized spelled-speech. (Author)

AD-262 309 Div. 30, 1
(1 Sep 61) OTS price $2.00

National Aeronautics and Space Administration, Washington, D. C.
THE DEVELOPMENT OF AN 8-INCH SLOTTED TUNNEL FOR MACH NUMBERS UP TO 1.28,
by B. H. Little, Jr. and James M. Cubbage, Jr.
Aug 61, 72p. incl. illus. 12 refs. (NASA Technical note no. D-908; Supersedes Research memo. no. L55B08, AD-62 524)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note no. D-908.

DESCRIPTORS: *Transonic wind tunnels, Design, Test facilities, Transonic flow, Diffusers, Wind tunnels.

An 8- by 8 in. transonnic tunnel model with test section slotted on two opposite walls was constructed in which particular emphasis was given to the development of slot geometry, slot-flow re-entry section, and short-diffuser configurations for good test-region flow and minimum total-pressure losses. Center-line static pressures through the test section, wall static pressures through the other parts of the tunnel, and total-pressure distributions at the inlet and exit stations of the diffuser were measured. With a slot length equal to two tunnel heights and 1/14 open-area-ratio slotted walls, a test region one tunnel height in length was obtained in which the deviation from the mean Mach number was less than ±0.01 up to Mach number 1.15. With 1/7 open-area-ratio slotted walls, a test region 0.84 tunnel heights in length with deviation less than ±0.01 was obtained up to Mach number 1.26. (Author)

AD-262 332 Div. 30, 22, 25
(31 Aug 61) OTS price $3.60

Ordnance Research Lab., Pennsylvania State U., University Park.
THE DABOB BAY NOISE-MEASURING SYSTEM. SECTION II: NOISE ANALYSIS,
by J. M. Bringman and R. F. Marboe. 15 Aug 61, 38p. incl. illus. tables (Serial no. NOrd 16597-79, Section 2)
(Contract NOrd-16597)
Unclassified report

DESCRIPTORS: *Noise analyzers, Design, Maintenance, Test equipment, *Torpedo noise, Analysis, Noise, Sources, Spectrographic analysis, Hydrophones, Operation, Magnetic recording systems, Magnetic tape, Underwater sound, *Ship noise.

The various types of test equipment, analyzers, and recorders necessary for narrow-band and one-third-octave analyses of signals recorded on magnetic tape were assembled. These equipments are an Ampex FR1107 7-channel tape recorder used in reproducing the original noise recordings, an Ampex FR1102 2-channel recorder used in making and playing the tape loops, a Ballantine 310 high-frequency voltmeter, a test panel used in checking out the Ampex FM units, a patch panel that serves as a connecting link for the equipment in the racks, a Hewlett-Packard 521C Eput meter, a Ballantine 300 voltmeter, a Hewlett-Packard 120A oscilloscope, a Hewlett-Packard 200CD oscillator, an audio monitoring amplifier, a TP-626 oscillator, a TP-627 analyzer equipped with 2-, 5-, 50-, and 200-cps filters, a TP-4A level recorder, and a Bruel and Kjaer one-third-octave analyzer and level recorder. (Author)

AD-262 333 Div. 30, 22, 25, 6
(31 Aug 61) OTS price $8.60

Ordnance Research Lab., Pennsylvania State U., University Park.
THE DABOB BAY NOISE-MEASURING SYSTEM: SECTION I: SYSTEM OPERATION,
by J. M. Bringman and R. F. Marboe. 15 Aug 61, 97p. incl. illus. (Serial no. NOrd-16597-79, Section 1)
(Contract NOrd-16597)
Unclassified report

DESCRIPTORS: *Noise analyzers, Operation, Design, Underwater sound, *Ship noise, *Torpedo noise, Analysis, Measurement, Hydrophones, Magnetic recording systems, Calibration, Automatic, Preamplifiers, Transistors, Maintenance, Spectrographic analysis, Amplifiers.

The Dabob Bay Noise-Measuring System operation is described in signal-flow order, beginning with the hydrophones and continuing through the amplifiers and other components of the system. Although the system makes use of some commercial components, operating instructions in each section are complete and do not refer to manufacturers' instruction manuals. Maintenance, however, is limited to preventive maintenance, and the reader is referred to the manufacturers' instruction manuals for detailed maintenance information. (Author)

AD-262 404 Div. 30, 28
(5 Sep 61) OTS price $6.60

Research Inst., U. of Michigan, Ann Arbor.
N. P. PSYTAR. NOISE PROGRAMMED PSYCHOPHYSICAL TESTER AND RECORDER,
by G. A. Roberts. Mar 61, 59p. incl. illus. table (Technical memo. no. 86; Rept. no. 2899-48-T)
(Contract DA 36-039-sc-78283, Proj. 3A99-06-001-01)
Unclassified report

DESCRIPTORS: *Psychology, *Test sets, *Computers, Programming, Electronic equipment, Electronic circuits, Digital computers, Circuits, Test equipment.

A machine for automatically performing psychophysical experiments, known as N. P. Psytar, is described. N. P. Psytar is an electronic system that generates timing controls, makes random selections of signals for presentation to the observers (experimental subjects), and records the observers' answers. The system requirements, logic, block diagram design, and circuits are presented. (Author)

AD-262 414 Div. 30, 9
(5 Sep 61) OTS price $5.60

National Aviation Facilities Experimental Center, Atlantic City, N. J.
A STUDY OF DESIGN REQUIREMENTS FOR A FULL-SCALE WIND TUNNEL.
Final rept.,
by John Sommers, Roy K. Hackbarth, and Eugene P. Klueg. Mar 61, 58p. incl. illus. tables.
Unclassified report

DESCRIPTORS: *Wind tunnels, Design, *Aircraft fires, Test facilities, Airplane engines, *Turbojet engines, Subsonic flow, Axial flow compressors, Helicopter engines, Aerodynamics, Ducted fans.

A basic design study of high-speed subsonic wind tunnel configurations was undertaken to determine the most feasible design for use in fire testing full-scale aircraft powerplants. Three proposed designs were considered; namely, the modification of the facility used at the Indianapolis Technical Development Center, a facility using a motor-driven fan, and a facility using turbojet engines for ejector pumping. Initial costs of construction were compared. The study indicated that a wind tunnel using turbojet engines for ejector pumping as the principal power source would satisfy effectively the requirements for such a fire test facility. Of the designs considered, the induction wind tunnel is recommended as the most economical subsonic fire-test facility from the standpoint of initial cost. (Author)

AD-262 445 Div. 30, 25, 22
(5 Sep 61) OTS price $10.50

Thompson, John I., and Co., Inc., Washington, D. C.
OPTICAL GAGING MANUAL.
1961, 128p. incl. illus.
(Contract DA 36-034-ORD-3367)
Unclassified report

DESCRIPTORS: *Optical instruments, Telescopes, Collimators, *Handbooks, *Ordnance, Standards, Tests, Test equipment, Optics.

The application of line-of-sight optical instrumentation for the inspection of ordnance materiel is outlined. The contents are presented in two parts. Part I descriptively catalogues commercially available optical instruments such as telescopes, levels, and collimators, that may be used as gages or as auxiliaries to gages for the inspection of ordnance materiel. Part II explains and illustrates practical uses of optical equipment as it may be applied to the fundamental inspection situations mentioned above. It is intended that this handbook be used as an aid to inspection engineering personnel responsible for designing, developing methods, or specifying equipment for inspection systems. (Author)

AD-262 464 Div. 30
(6 Sep 61) OTS price $3.60

Southern Research Inst., Birmingham, Ala.
DEVELOPMENT AND CONSTRUCTION OF A PORTABLE PARTICLE PHOTOMETER AND SIZE DISTRIBUTION ANALYZER.
Final rept., 8 Mar 60-8 Apr 61,
by Robert H. Collins, III and Albert L. Thomas, Jr. 11 Apr 61, 29p. incl. illus. tables.
(Rept. no. 4892-1176-IV)
(Contract DA 18-064-404-cml-489)
Unclassified report

DESCRIPTORS: *Photometers, Particles, Measurement, Counting methods, Sampling, Bacterial aerosols, Sensitivity.

The objective of the project was the development and construction of a small battery-operated particle size distribution recorder capable of obtaining statistically valid data rapidly enough to display coherent distribution recordings. Other objectives were the ability to operate over the temperature range expected to be encountered out of doors, the ability to be continuously battery-operated for five hours, and the ability to automatically make size distribution measurements at given intervals for extended periods. The instrument developed is composed of three separate cable-connected housings.

The photometer housing in the foreground contains the sample flow system, the photometer, a voltage regulator, two pre-amplifiers, and two high voltage supplies. The analyzer housing contains the batteries, the d-c to d-c converters, the amplifying and discriminating circuits, and the switching system. The recorder is a commercial battery-operated, dual-pen, strip chart recorder, modified for use in this instrument. (Author)

AD-262 466 Div. 30
(6 Sep 61) OTS price $4.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
DESCRIPTION AND PRELIMINARY CALIBRATION OF A LOW-DENSITY, HYPERVELOCITY WIND TUNNEL,
by J. Leith Potter, Max Kinslow, and others.
Aug 61, 49p. incl. illus., 38 refs. (Rept. no. AEDC TN 61-83)
(Contract AF 40(600)800)
Unclassified report

DESCRIPTORS: *Hypersonic wind tunnels, High temperature research, Hypersonic flow, *Hypersonics, Calibration, Design, Pressure, Spheres, Wind tunnel nozzles, Hypersonic diffusers, Simulation, Measurement, Drag, Density, Reynolds number.

A small, low-density, hypervelocity, continuous wind tunnel operating at total temperatures from 2000 to 4000 K is described, and initial experiments designed to determine the characteristics of the flow are discussed. Effects of low Reynolds numbers on impact-pressure probes and static-pressure probes are shown. Preliminary work with a probe for measuring local mass-flow rate is outlined, and results are shown to be in agreement with impact and static pressure measurements. Axial and transverse surveys of flow in the nozzle are presented to illustrate the extent of boundary-layer growth and the useable core of flow. A diffuser is proved to be advantageous, even though very low Reynolds numbers are typical of the tunnel. A comparison of data on drag of spheres, including measurements from the new wind tunnel, is presented. (Author)

AD-262 481 Div. 30, 28
(6 Sep 61) OTS price $4.60

Amelco, Inc., Los Angeles, Calif.
DATA PROCESSING. THE EXTENSION OF MAN'S SENSORS AND PHYSICAL CAPABILITIES. ANIP RESEARCH.
June 61, 49p. incl. illus. tables (Rept. no. 1)
Unclassified report

DESCRIPTORS: *Data processing systems, *Human engineering, Instrumentation, Computers, Equations, Digital systems, Electronics.

Contents:
Data processing
What is data processing
Derivation of energy-information relation
The over-all system
The data processing system
Remarks concerning function generators
System block diagram
A methodology for evaluating data processing systems
Information flow vs clock rate
Information channel capacity
Analysis of some existing systems
Other parameters
Microelectronics
Summary of microelectronics to date
Phase I--application to production:
The functional array

AD-262 501 Div. 30
(7 Sep 61) OTS price $2.60

Diamond Ordnance Fuze Labs., Washington, D. C.
MEASUREMENT OF TEMPERATURE. ADVANCED STATE-OF-THE-ART BIBLIOGRAPHY,
by Joseph Pearlstein. 15 Aug 61, 27p. (DOFL rept. no. TR-969)
(Proj. 30300)
Unclassified report

Presented at the Fourth Symposium on Temperature: Its Measurement and Control in Science and Industry, held in Columbus, Ohio, March 27-31, 1961.

DESCRIPTORS: *Bibliography, *Temperature, Measurement, Temperature control, Symposia, *Thermocouples, Calibration, *Heat treatment, Pyrometers, Automatic, Plasma physics, Heat, Instrumentation, Cryogenics.

AD-262 542 Div. 30, 25, 8
(6 Sep 61) OTS price $1.10

Lincoln Lab., Mass. Inst. of Tech., Lexington.
A MICROWAVE MAGNETIC MICROSCOPE,
by R. F. Soohoo. 23 Aug 61, 4p. (Rept. no. 53G-0064)
(Contract AF 19(604)7400)
Unclassified report

DESCRIPTORS: *Microscopes, *Microwave probes, Magnetic properties, Determination, Microwaves, Detection, Measurement, *Resonance absorption.

A microwave magnetic probe which is capable of measuring the spatial variations of the magnetic properties of materials is described. In contrast to other forms of microscopes, this one measures the spatial variations of the important magnetic properties of a sample directly. By a selectively microwave resonance absorption technique, the gyromagnetic ratio, magnetization, line width, exchange constant, surface and anisotropy energies, etc. of small portions of a ferromagnet may be determined consecutively. (Author)

AD-262 582 Div. 30
(6 Sep 61) OTS price $1.60

School of Aerospace Medicine, Brooks Air Force Base, Tex.
AN ELECTROCHEMICAL DEVICE FOR MEASURING OXYGEN,
by J. Ryan Neville. June 61, 11p. incl. illus. 15 refs. (Rept. no. 61-79)
Unclassified report

DESCRIPTORS: *Oxygen, Measurement, Electrochemistry, Electrical equipment, *Polarographic analysis.

The present paper describes an electrochemical device for measuring oxygen which is basically a simple polarographic unit, but has certain details and characteristics which it may be worthwhile to report. The device was designed primarily to measure oxygen in gases rather than in liquids, and this design has allowed applications under many adverse field conditions over relatively long periods of time. Essentially, the design involves the use of suitable electrodes placed in an insulated electrode housing. An electrolyte is added and a gas-permeable membrane applied in such a manner as to encapsulate the electrodes and fluid after suitable degassing procedures have been carried out. An additional feature is a protective cover which holds the membrane in place and prevents it displacement or rupture through rough handling. (Author)

AD-262 585 Div. 30, 8
(8 Sep 61) OTS price $2.60

Reconnaissance Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
AN ANALOG COMPUTER FOR LINEAR ARRAY ANTENNA ANALYSIS.
Rept. on Development of Reconnaissance Antennas and Antenna Techniques,
by Arthur L. Haywood. Nov 60, 21p. incl. illus. tables.
(Proj. no. 6292)
(WADD TR 60-666) Unclassified report

DESCRIPTORS: *Analog computers, Antennas, Design, *Antenna radiation patterns, Synthesis, Polynomials, Mathematical prediction, Theory, Determination, Mathematical computer data.

Many antenna design problems could be solved by the potential analog computer. One of the problems that the computer can solve is the determination of array feeding coefficients when only the desired radiation pattern is known. This report discusses the characteristics and limitations of the computer. A typical symmetrical and an asymmetrical pattern antenna are computed illustrating the use of the potential analog computer. (Author)

AD-262 603 Div. 30, 18
(7 Sep 61) OTS price $8.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
THE MILITARY APPLICATION OF ELECTRONIC COMPUTERS (Elektronnyye Mashiny V Voyennom Dele),
by V. A. Plisko. 3 Aug 61, 87p. incl. illus. tables (Trans. no. MCL-898 of USSR Ministry of Defense Military Press, Moscow, 74p. 1960)
Unclassified report

DESCRIPTORS: *Computers, *Cybernetics, *Military operations, *Military research, Fire control computers, Antiaircraft defense systems, Logistics, USSR, Technological intelligence, Fire control systems, Shipborne.

Contents:
Electronic computers count
Types of electronic computers
The basic units of electronic computers
Computers control weapons
Electronic computers think
The possibilities of computers for solving operational-tactical problems
The use of computers for military-scientific investigations
The use of computers in some types of military equipment
Antiaircraft guidance systems
Rocket and artillery installations
Ship armament
Ground and airborne aviation systems
Training equipment
Rear-area service instruments

AD-262 633 Div. 30
(8 Sep 61) OTS price $17.50

Autonetics, Downey, Calif.
THE LITERATURE OF MACHINE TRANSLATION: AN ANNOTATED BIBLIOGRAPHY,
by Barbara Ann Bryce. 28 Aug 61, 272p. (Rept. no. EM-7249)
Unclassified report

DESCRIPTORS: *Bibliography, *Machine translation, Language, Literature, Computers.

This annotated bibliography of 818 references presents most of the available literature on machine translation and shows progress made yearly from 1949 to mid-1961 in the MT field, both in the United States and abroad. The references are grouped alphabetically within these years. An appendix follows, listing approximately 40 individuals and organizations working on MT, with a brief description of their research and future plans in research and development of machine translation. Author and source indexes follow Appendix. (Author)

AD-262 634 Div. 30, 27, 4
(8 Sep 61) OTS price $1.75

Armour Research Foundation, Chicago, Ill.
EXPERIMENTAL STUDIES TO DETERMINE THE CHEMICAL SPECIES PREVALENT IN THE PLASMA OF AN AIR ARC AND THE BOUNDARY LAYERS ADJACENT TO ABLATING MATERIALS.
Rept. for 1 June 59-31 May 60 on Experimental Techniques for Materials Research,
by R. Carrigan, E. Raisen and K. Schmude.
Oct 60, 57p. incl. illus. tables.
(Contract AF 33(616)6686, Proj. 7364)
(WADD TR 60-359) Unclassified report

DESCRIPTORS: *Plasma jets, *Ablation, Gas ionization, Design, Test equipment, Test methods, Physical properties, Enthalpy, Thermodynamics, Electrical properties, Temperature, Reaction kinetics, Spectrographic data, Electrodes, Mass spectrometers, Oscilloscopes, Plasma physics, Mass spectroscopy, Optics, Spectrographic analysis.

The objective of this work is to obtain an increased understanding of plasma jet processes as related to the use of the plasma jet arc to test ablating systems. Plasma jets were constructed and operated as sources for optical and time-of-flight mass spectrometry. Optical spectroscopic methods were used to identify chemical species and state of excitation when inert gas or air was used as the plasma arc working medium. Time-of flight mass spectrometry was not developed to the point where species could be identified. (Author)

AD-262 667 Div. 30, 23, 1
(8 Sep 61) OTS price $8.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
DYNAMIC TEST PROGRAM FOR WEAPON SYSTEMS TRAINERS.
Summary rept. on Phase 4,
by Frederick D. Newell and Arno E. Schelhorn.
2 June 61, 93p. incl. illus. tables, 13 refs.
(Contract N61339-318, Proj. 413(2))
(NAVTRADEVCEN 318-4) Unclassified report

DESCRIPTORS: *Training devices, *Flight simulators, Tests, Test equipment, Pilots, Training.

This report is a technical summary of a study which determined the valuable use of dynamic test procedures for evaluating and acceptance testing operational Flight Trainers and Weapon System Trainers. Discussion of the background upon which the decisions as to what parameters should be measured and how closely they should compare to airplane characteristics is given. The implementation of dynamic testing is depicted and then demonstrated by the results of tests performed on both A.C. carrier and D.C. computers of representative simulators. Among the several forms of dynamic testing that could be used, prime emphasis is placed upon transient response techniques for the over-all simulator testing and both transient response and frequency response techniques for evaluating servo components of the simulator computer. Means for determining handling qualities and performance characteristics are displayed. (Author)

AD-262 681 Div. 30
(8 Sep 61) OTS price $1.60

Weston Instruments Div., Daystrom, Inc., Newark, N. J.
PRODUCTION ENGINEERING MEASURE FOR RUGGEDIZED TAUT BAND SUSPENSION PANEL METERS PER SIGNAL CORPS TECHNICAL REQUIREMENT SCS-43A,
Quarterly progress rept. no. 1, 31 Mar-30 June 61, 30 June 61, 12p. illus.
(Contract DA 36-039-sc-85952)
Unclassified report

DESCRIPTORS: *Meters, Design, Production, *Springs, Magnets.

Efforts are being made to design, develop, engineer and test in order to obtain preproduction approval for manufacture of ruggedized taut band suspension panel meters. Design concepts of the ruggedized taut band suspension meters are set forth. Detailed considerations of the design are discussed. Initial samples were fabricated, assembled and subjected to tests. A performance analysis is discussed. (Author)

AD-262 777 Div. 30
(12 Sep 61) OTS price $6.60

Naval Ordnance Test Station, China Lake, Calif.
INSTRUMENT OPERATIONS ON TEST DEPARTMENT RANGES, 1 June 61, 62p, incl. illus. tables (Rept. no. NOTS TP 2692)
Unclassified report

DESCRIPTORS: Test equipment, Tests, *Instrumentation, Photographic equipment, Optics laboratories, Telemetering, Electronics laboratories, Meteorology, Weather forecasting, *Laboratories, Photographic analysis, Photography, Cameras, Phototheodolites, *Test facilities, Satellite vehicles, Tracking, Doppler radar, Radar tracking, Radiosondes.

The organization, personnel, test equipment, capabilities, and typical test activities are described of the Instrument Operations Division of the NOTS Test Department. (Author)

AD-262 790 Div. 30, 25
(12 Sep 61) OTS price $4.60

National Bureau of Standards, Washington, D. C.
EVALUATION OF RESISTANCE STRAIN GAGES AT ELEVATED TEMPERATURES.
Progress rept. no. 12,
by J. T. Trumbo, C. H. Melton, and R. L. Bloss.
May 61, 1v. incl. illus. tables, 13 refs. (NBS rept. no. 7161)
(Sponsored by Bureau of Naval Weapons)
Unclassified report

DESCRIPTORS: *Strain gages, High temperature research, Temperature, Resistance, Tests, Laboratory equipment.

Type FNH-25-12B resistance strain gages were evaluated at elevated temperatures. The factors investigated included (1) gage factor at about 75 F, (2) variation of gage factor with increasing temperature, (3) response when subjected to large strains, (4) change of resistance with time at various constant temperatures, (5) change of resistance with temperature, (6) response when subjected to high heating rates, and (7) resistance between the gage and the base material. The results of these tests indicate that the gage factor at 75 F is within the manufacturer's stated range; that the gage factor at 1000 F is about 90% of the room temperature value; that the gages are able to sustain strains of 0.004 at 75 F and of 0.002 at 600 F; that the temperature coefficient of resistance of the gages installed on type 302 stainless steel is high, positive, and nearly constant between 75 and 800 F but changes rapidly and becomes very high between 800 and 1200 F; and that the gage response is repeatable under a given transient heating condition. (Author)

AD-262 819 Div. 30
(21 Sep 61) OTS price $1.10

Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.
ON THE RESPONSE OF SHOCK-SPECTRUM GAUGES,
by John W. Miles. 26 June 58, 7p. incl. illus.
(Rept. no. GM-TN-0165-00150)
(Contract AF 04(647)165)
(Document no. 8-7120) Unclassified report

DESCRIPTORS: *Shock waves, *Harmonic oscillators, Measurement, Blast, *Soils, Density, Pressure, *Pressure gages, Impedance, *Integrals, *Integration, Differential equations, Wave transmission.

An approximate analysis for the maximum response of a buried, simple harmonic oscillator (shock-spectrum gauge) to a blast wave moving along the surface is carried out on the assumption of essentially one-dimensional, elastic wave propagation from surface to gauge. The result is of the form q sub m = (p sub m T/rho c) F sub m (omega T), where q sub m denotes maximum displacement, p sub m peak overpressure, T duration of positive pressure, rho soil density, c dilatational wave speed, omega natural frequency of oscillator, and F sub m the maximum value of the convolution of the pressure signature. (Author)

AD-262 840 Div. 30, 8
(7 Sep 61) OTS price $.50

Diamond Ordnance Fuze Labs., Washington, D. C.
TRANSDUCERS. LIST OF CURRENT STATE-OF-THE-ART PROJECTS,
by Joseph Pearlstein. 10 Aug 61, 19p. (DOFL rept. no. TR-968)
(Proj. 30300)
Unclassified report

Information from the Second Transducer Users Workshop held at Holloman Air Force Base, New Mexico on 25-26 July, 1961, sponsored by the Telemetry Working Group (TWG) of the Inter-Range Instrumentation Group (IRIG).

DESCRIPTORS: *Transducers, Measurement, Indexes, Acceleration, Instrumentation, Tests, Vibration, Velocity, Temperature, Radiation effects, Pressure, Control, Flight testing, Flowmeters, Digital systems.

A list is presented of current research and development projects on transducers and related systems compiled by the Aeronautical Systems Division, Wright-Patterson Air Force Base. (Author)

AD-262 897 Div. 30, 14
(14 Sep 61) OTS price $1.60

Brown U., Providence, R. I.
CONCERNING STRAIN GAGE MEASUREMENT OF CREEP OF PLASTICS.
Final rept.,
by W. N. Findley and R. M. Reed. Aug 61, 17p. incl. illus. (Rept. no. EMRL-18)
(Contract DA 19-020-501-ORD-4594, Proj. TB4-003D)
Unclassified report

DESCRIPTORS: *Strain gages, Test equipment, Heat transfer, Sensitivity, Design, *Plastics, Creep, Stresses, Measurement, Test methods.

A means of minimizing the effect of heat dissipated in a resistance type strain gage is presented, together with an evaluation of the significance of the stiffening effect of such gages on the apparent creep strains when used on plastics. The pulsing method described for minimizing the effect of heat dissipated in resistance strain gages when attached to plastics seems to reduce the effect to negligible proportions. The presence of a resistance strain gage cemented to a rigid vinyl plastic 0.060 in. thick was calculated to stiffen the material to such an extent that the creep strain after 1000 hr. for the example chosen was 17% lower than would have resulted had the strain gage not been present. (Author)

AD-262 906 Div. 30, 8
(14 Sep 61) OTS price $5.60

Denver Research Inst., Colo.
AN INVESTIGATION OF A SEMIAUTOMATIC IMPEDANCE INDICATOR.
Special rept.,
by Richard Sundstrom. 1 June 61, 55p. incl. illus.
(Contract NOa(s) 60-6031-c)
Unclassified report

DESCRIPTORS: *Impedance, Display systems, Ultra high frequency, Errors, *Antennas, Measurement, Oscilloscope screens, Test equipment, Electromagnetic wave reflections, Electronic circuits, Radiofrequency generators, Design, Tests, Potentiometers, Slot antennas, Amplifiers, Narrowband.

An impedance indicator, which displays the impedance of a terminating load on an oscilloscope with a Smith chart overlay, was designed and built. The frequency range of the indicator is from 450 to 1000 mc and has a possible maximum amplitude error of approximately 13% above 500 mc. The average error is approximately 9.5%. (Author)

AD-262 912 Div. 30, 25
(14 Sep 61) OTS price $8.60

Georgia Inst. of Tech. Engineering Experiment Station, Atlanta.
BACKGROUND INTENSITIES IN SINGLE CRYSTAL DIFFRACTOMETRY,
by R. A. Young. 27 July 61, 85p. incl. illus. table (Technical rept. no. 2)
(Contracts Nonr-99100 and Nonr-99106)
Unclassified report

DESCRIPTORS: *Single crystals, Diffraction, *X-ray diffraction analysis, Harmonic analysis, Temperature, Pulse height analyzers, Measurement, X rays, Scattering, Crystal counters, Spectrographic analysis, Quartz crystals, Scintillation counters, Band-pass filters, Collimators.

The question of the component parts and character of the background in X-ray diffraction was reexamined in some detail. The components are divided into two classes: (1) those which may be peaked at the Bragg position, principally the harmonic components and (2) those which do not peak at the Bragg position, here called the miscellaneous components. An expression is presented for the dependence of the harmonic contributions on counter aperture, structure factors, Bragg angle, temperature, and other parameters. The qualitative correctness of the expression is demonstrated by experimental results. The control and measurement of the miscellaneous component is also considered. Particular attention should be given to the counter aperture size and to both incident and receiving collimators even with the large beam used in single crystal diffractometry. Detailed procedures for correct background determination with balanced filters are presented. While the present discussion is concerned principally with single crystal diffractometry, implications to film methods and to powder diffractometry are also pointed out. (Author)

AD-262 917 Div. 30
(14 Sep 61) OTS price $1.10

Kaman Nuclear, Colorado Springs, Colo.
DEVELOPMENT AND FABRICATION OF NON-DESTRUCTIVE SPECIFIC GRAVITY MEASURING EQUIPMENT EMPLOYING RADIATION TECHNIQUE.
Monthly progress rept. no. 34, 1-30 June 61. 30 June 61, 3p. (Rept. no. 58-92-PR-34)
(Contract DA 19-059-501-ORD-2631)
Unclassified report

DESCRIPTORS: *Non-destructive testing, Test equipment, Density, *Density sensitive indicators, Measurement, Radiographic analysis, Radiation instruments, Thermal switches, Design, Photomultipliers, Servo amplifiers, Tests.

A complete check-out of the density measurement portion of the system was initiated. The power control circuits were tested and found to operate satisfactorily with the exception of their behavior during power failures. The photomultiplier and its associated circuitry were checked and found to operate satisfactorily. The circuitry associated with the photomultiplier consists of a passive filter, a clipping amplifier and a tuned amplifier that processes the photomultiplier pulse signal so that it may drive the servo amplifier. The servo amplifiers were checked and found to operate properly. (Author)

AD-262 934 Div. 30, 8
(14 Sep 61) OTS price $2.60

National Bureau of Standards, Boulder, Colo.
EXACT EQUATIONS FOR THE RADIO FREQUENCY MAGNETIC PERMEAMETER.
by Cletus A. Hoer and Alvin L. Rasmussen.
11 Aug 61, 21p. incl. illus. (NBS rept. no. 6794)
(Sponsored by Bureau of Ships, Dept. of Navy and Army Signal Research and Development Lab., Fort Monmouth, N. J.)
Unclassified report

DESCRIPTORS: *Transformers, *Impedance, Radiofrequency, Ferrite cores, Magnetic materials, Measurement, Calibration, Equations, Mathematical analysis, *Permeameters.

A set of exact equations is derived for initial or reversible permeability (mu prime) and dissipation factor (tan delta) using the rf permeameter (an impedance transformer for measuring toroidally-shaped magnetic materials at radio frequencies) for which no assumptions regarding the arms of the equivalent T-network have been made. A low loss toroidally-shaped magnetic material is used as an impedance standard in calibrating the permeameter in terms of the exact equations. An evaluation is made of the results obtained using these equations and other equations based on assumptions regarding the T-network. A frequency range from 0.1 mc to 50 mc and a tan delta range from 5 x .0001 to 5 are covered. The comparison shows that expressions for tan delta based on assumptions regarding the equivalent transformer structure produce errors of several orders of magnitude when applied to low loss materials, and that some equations for mu prime may be in error as much as an order of magnitude for high loss materials. The utility of the permeameter is particularly important in the measurement of magnetic materials in the 0.1 mc to 50 mc frequency range where it has a convenient impedance not readily obtained by using other techniques. (Author)

AD-262 938 Div. 30
(14 Sep 61) OTS price $1.00

National Aeronautics and Space Administration, Washington, D. C.
NATIONAL WIND-TUNNEL SUMMARY.
July 61, 39p. incl. illus. tables.
(In cooperation with Department of Defense, Washington, D. C.)
Unclassified report

DESCRIPTORS: *Test facilities, Wind tunnels, *Transonic wind tunnels, *Supersonic wind tunnels, *Hypersonic wind tunnels, Tables, Data.

A ready reference is provided on current wind-tunnel facilities for governmental, industrial and institutional organizations that employ wind tunnels. The tables contain data on major wind tunnels in the United States owned by the Department of Defense, the National Aeronautics and Space Administration (NASA), industrial organizations, and universities. The information was obtained from questionnaires completed and returned by the operators of the wind tunnels. Included are facilities that are now in operation or being constructed and those that are currently authorized. The wind tunnels reported in this survey are classified according to their size and speed range. (Author)

AD-262 939 Div. 30, 6
(13 Sep 61) OTS price $9.10

Radiation Inc., Orlando, Fla.
DATA GATHERING INSTRUMENTATION.
Feb 61, 104p. incl. illus. tables.
(Contract AF 30(602)2209)
(RADC TR 61-167) Unclassified report

DESCRIPTORS: *Display systems, Radar equipment, Time signals, Airborne, Coding, Automatic, Monitors, *Data processing systems, Reliability, Maintenance, Recording devices, Range finding, Azimuth, Data transmission systems.

The airborne time system, radar display system, and modification to automatic monitoring and data processing systems (AMDPS) were designed, fabricated, installed, and checked out. The airborne time system is an extension of the time signal set AN/USQ-23(V). The system extended the range of the time signal set from 2 miles to 200 miles. The time signal is prepared for transmission over a standard radio link. The signal is received in aircraft and the time code is then decoded for visual display and magnetic tape recording. Physical requirements of the Units were dependent upon aircraft environment. The radar data display system is used to distribute MSQ-1A and MOD-III radar range and azimuth information at several remote locations. The information is transmitted over an audio land line. The transmission method is serial on-off tone burst. The range and azimuth information is demodulated and stored for visual display at each remote site. A decimal readout is accomplished with nixie indicator tubes. The automatic monitoring and data processing equipment data recorder modification consisted of increasing the recording capability of the data recorder by better utilizing the total available recording time. In addition to increasing the recording capability, the recording cycle was altered to operate on a straight time basis and also on a per radar scan basis. This feature enabled the recording cycle to be in synchronism with the radar set associated with the data recorder. Reliability and maintainability is presented. (Author)

AD-262 972 Div. 30
(7 Sep 61) OTS price $12.50

Systems Research, Ltd., London (Gt. Brit.).
RESEARCH ON THE DESIGN OF ADAPTIVE TEACHING SYSTEMS WITH A CAPABILITY FOR SELECTING AND ALTERING CRITERIA FOR ADAPTATION.
Annual summary rept. no. 1, 1 Apr 60-31 Mar 61, on Adaptive Teaching Systems.
25 Apr 61, 180p. incl. illus. tables.
(Contract AF 61(052)402)
Unclassified report

DESCRIPTORS: *Teaching machines, Design, Learning, Dynamics, Training devices, Vocabulary, Theory, Analysis.

Identification between learning and teaching processes and a self organising system. Group interaction with a tuitional and stabilising system, and description of the machine. Technical summary. Outline description of a simple adaptive device. A semantic ordering machine. Hypotheses regarding the structure of the learning process. Possible hypotheses. Critical comments and nomenclature. (Author)

AD-263 005 Div. 30, 5
(26 Sep 61) OTS price $1.60

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
CODING FOR TWO-WAY CHANNELS,
by John M. Wozencraft and Michael Horstein.
3 Jan 61, 16p. incl. illus. tables, 11 refs.
(Technical rept. no. 383)
(Contract DA 36-039-sc-78108, Proj. 3-99-00-000)
Unclassified report

Presented at the Fourth London Symposium on Information Theory, London, August 29-September 3, 1960.

DESCRIPTORS: *Coding, Communications systems, *Feedback, Analysis, Computers, Communication theory, *Digital computers, Simulation, Transmission, Experimental data.

When time-variant noisy two-way channels are protected by coding, they may be used to provide essentially noiseless feedback, with delay. Service messages can be automatically exchanged between terminals, and transmission altered in such a way that the average communication rate is increased, given fixed receiver computers. The system is somewhat similar to human communication, in that typical errors are corrected, while grievous ones initiate a request for retransmission. One-way experimental data are presented to complement the approximate theoretical analysis. (Author)

AD-263 010 Div. 30, 25
(15 Sep 61) OTS price $1.60

Institut d'Optique, Paris (France).
DESIGN OF A COMPUTER ESPECIALLY ADAPTED TO THE STUDY OF THE PROPERTIES OF THIN FILMS.
Final technical rept. no. 1, 1 July 60-30 June 61.
30 June 61, 11p. incl. illus.
(Contract DA 91-591-EUC-1495)
Unclassified report

DESCRIPTORS: *Computers, *Design, *Thin films, Computer logic, France.

SCALE MODEL OF THE ARITHMETIC AND LOGICAL PART OF THE COMPUTER: This part executes the following functions: algebraic sums, transfer from the coder into a register, normalization, and cadrage. The noise introduced by the impedance of the power supply lines was reduced by lowering their resistance and by passing them by large capacitors. CENTRAL CONTROL: A program was written with which to test the functioning of the magnetic drum and to experiment with the adaptation of the computer to its memory. THE INITIAL ORDERS: Addresses (300) are used in the program for instructions, data, and partial results. Not all of the 300 will have to be filled in manually. It will be sufficient to send to the memory (by means of the coder and a register) the sequence of instructions and data necessary to form instructions and to place them at successive addresses. THE BUFFER: A Model FL Flexowriter constitutes the input and output part of the computer. The input and output signals for the Flexowriter are shown by diagram. A logical scheme is given for the buffer which connects the Flexowriter to the computer.

AD-263 057 Div. 30, 22, 12
(18 Sep 61) OTS price $5.60

Frankford Arsenal, Philadelphia, Pa.
ANALOG COMPUTER STUDY OF REACTIONLESS LAUNCHERS.
by S. Goldstein and S. Narisi. June 61, 61p. incl. illus. (Rept. no. R-1589)
(ARPA Order no. 39-59, Task 8)
Unclassified report

DESCRIPTORS: *Recoil mechanisms, Guns, *Launching, *Interior ballistics, *Analog computers, Ballistics, Guided missiles, Ejection, Dynamics, Analysis, Tests, Test methods.

Closed-breech interior-ballistic equations were modified for predicting the performance of reactionless launchers. Test firings were made using two reactionless launchers of the Davis Gun type. Direct and high-low launchers were considered. The test firing data was compared with the curves obtained from an analog computer. Using the differences noted, certain factors of the original equations programmed into the computer were varied in order to bring the computer curves into close agreement with actual test results. These factors included heat loss coefficient, initial charge burnt, and in the case of the high-low gun the effective mean impetus of the propellant during the ballistic cycle. It was concluded that the knowledge gained with the computer can be used to optimize the performance of reactionless systems. (Author)

31. SHIPS AND MARINE EQUIPMENT

AD-262 648 Div. 31, 9
(11 Sep 61) OTS price $11.00

Massachusetts Inst. of Tech., Cambridge.
THE SOLUTION OF PROPELLER LIFTING SURFACE PROBLEMS BY VORTEX LATTICE METHODS.
by Justin E. Kerwin. June 61, 135p. incl. illus. tables, 40 refs.
(Contract Nonr-184163)
Unclassified report

DESCRIPTORS: *Marine propellers, *Propeller blades, Design, Lift, Numerical analysis, Wake, Load distribution, Pitch, Vortices, Algebra, Variable pitch propellers, Programming, Digital computers.

Methods are developed to determine pitch and camber corrections for marine propellers with arbitrary blade outline and radial load distribution. The pitch and camber is determined by the requirement that the desired load distribution be obtained with the sections operating at their ideal angle of attack. The method may be used both for homogeneous-flow and wake-adapted propellers. The method is an adaptation of the vortex lattice method developed for wings of arbitrary shape. By replacing the continuous vortex distribution by a lattice of discrete vortex elements, the singular integral equation occurring in lifting surface theory is replaced by a set of linear algebraic equations. From the form of these equations, it is shown that a propeller with symmetrical blades and with mean lines which are symmetrical about the mid-chord has no pitch correction due to lifting surface effect. (Author)

AD-262 943 Div. 31, 14
(14 Sep 61) OTS price $1.60

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
DEVELOPMENT OF DAMPING TREATMENTS FOR NEW CONSTRUCTION SUBMARINES.
Progress rept. no. 8,
by R. R. James. 7 Sep 61, 15p. incl. illus. 15 refs. (Rept. no. 94-32)
Unclassified report

DESCRIPTORS: *Submarine noise, Vibration, Resonance, Damping, Submarines, *Acoustic insulation, Insulating materials, Coatings, *Nitrile rubber, Preparation, Analysis, Vibration isolators.

A nitrile rubber treatment, the best developed to date for use on submarine light plating such as found in tanks and in the superstructure, is described. The treatment is given a conformance rating of 85% from the standpoint of damping efficiency over the frequency range of 100 to 6000 c and temperature range of 30 to 85 F. Additional tests are being performed to completely characterize the properties of the treatment. (Author)

AD-262 948 Div. 31, 17
(14 Sep 61) OTS price $2.60

Committee on Ship Structure, National Research Council, Washington, D. C.
ON VARIOUS PROBLEMS OF IMMEDIATE INTEREST TO A SHIP CLASSIFICATION MAN,
by Georg Vedeler. 1 Aug 61, 19p. incl. illus. (Serial no. SSC-136)
Unclassified report

DESCRIPTORS: *Ships, Cargo ships, Tankers, Design, Model tests, Load distribution, Moments, Water waves, Motion, Damping, Stability, Stability (Lateral), Stability (Longitudinal), Ship bulkheads, Ship decks, Ship hulls, Ship plates, Metal plates, Beams, Fracture (Mechanics), Stresses, Buckling.

Contents:
The Load Line Convention formula for the midship sections modulus
A survey of recent cracks in shell and deck
Buckling of deck
T2-tankers
Corrugated bulkheads
Absence of riveted crack arrestors
Broken Scandinavian tankers
Why tankers must be stronger than dry cargo ships
Intersecting girders
Transverse frames
Classification societies

AD-262 952 Div. 31
(14 Sep 61) OTS price $4.60

David Taylor Model Basin, Washington, D. C.
A METHOD OF CALCULATING THE SPINDLE TORQUE OF A CONTROLLABLE-PITCH PROPELLER AT DESIGN CONDITIONS,
by Robert J. Boswell. Aug 61, 36p. incl. illus. tables, 14 refs. (Rept. no. 1529)
Unclassified report

DESCRIPTORS: *Marine propellers, *Adjustable pitch propellers, Design, Mathematical analysis, *Propeller blades, Torque, Hydrodynamics, Pressure, Moments.

A procedure for calculating the spindle torque and for determining the optimum spindle axis location of a controllable-pitch propeller at design conditions is presented. From the blade geometry and theoretical pressure distribution the hydrodynamic and centrifugal forces acting on the blade are obtained, and from the distribution of these forces the spindle torque is calculated. The optimum spindle axis location is then determined by an iteration process. An example is included to illustrate the procedure. (Author)

32. MISCELLANEOUS ARTS AND SCIENCES

AD-262 550 Div. 32, 28, 15
(6 Sep 61) OTS price $6.60

California U., Berkeley.
THE EVALUATION OF INFORMATION IN ORGANIZATIONS, by Roy Radner. 1 June 61, 63p. (Technical rept. no. 2)
(Contract Nonr-22277, Proj. NR-047-029)
Unclassified report

DESCRIPTORS: Operations research, *Group dynamics, *Games theory, *Social communications, *Management engineering, Series, Matrix algebra, Special functions, Statistical analysis, Algebra, Probability.

Contents:
Team decision problems with quadratic payoff functions
Characterization of optimal decision functions and value of information in the quadratic case
Generation of information structures by processes of observation, communication, and computation
Complete communication, complete information, and routine
No communication and a case of complete informational decentralization
Partitioned communication
Dissemination of independent information
Error in instruction
Complete communication of erroneous observations
Management by exception: reporting exceptions
Management by exception: emergency conference
Comparisons among the several information structures

AD-262 849 Div. 32, 18
(12 Sep 61) OTS price $10.50

Planning Research Corp., Los Angeles, Calif.
TERM INDEX AND DICTIONARY.
10 Feb 61, 129p. (Rept. no. PRC D-393)
Unclassified report

DESCRIPTORS: *Indexes, *Dictionaries, Military intelligence, *Documentation, Data storage systems.

This document represents a limited dictionary of the unified terms selected to store information derived from photographs in a data processing center. The same terms should be used in any reports related to the subject areas covered by the system. At this time the dictionary is limited to terms employed in seven military fields of interest and in a partial coverage of industrial complexes. Experience has shown a wide difference in the approved or favorite terms used by Photo Interpreters and others in the field of intelligence analysis; thus synonyms and ambiguity are rampant. Successful standardization is a large and difficult task. However, the principle of one term--one meaning--must be established within an information storage system to provide assurance that the response to a retrieval request answers the desired inquiry--answers it correctly and eliminates extraneous data. (Author)

AD-262 882 Div. 32
(14 Sep 61) OTS price $5.60

National Bureau of Standards, Washington, D. C.
MATHEMATICAL RESEARCH RELATED TO INFORMATION SELECTION SYSTEMS.

Final rept.,
by Alan J. Goldman, Bernice K. Bender, and others.
30 June 61, 58p. (NBS rept. no. 6883)
(National Science Foundation Grant G-7579)
Unclassified report

DESCRIPTORS: *Documentation, *Data storage systems, *Data processing systems, Programming, *Computers, Combinatorial analysis, Mathematical analysis, Special functions.

Mathematical research relevant to information selection systems is described. Three areas of mathematical problems related to mechanization of the information retrieval process are considered: (1) efficient formulation of search questions, (2) rapid classification of incoming documents on a given one-dimensional scale, and (3) categorizing and manipulating documents and their relationships. (Author)

AD-262 935 Div. 32
(14 Sep 61) OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
A PLAN TO REDUCE COSTS OF TECHNICAL LIBRARY OPERATIONS IN THE DEPARTMENT OF DEFENSE,
by E. H. Langenbeck. 3 Aug 61, 12p. incl. illus.
(Rept. no. NOLTR 61-102)
Unclassified report

DESCRIPTORS: *Libraries, *Department of Defense, Reports, Processing, Catalogs, *Scientific reports, Costs, Computers, Coding, Subject headings.

From a management point of view, unnecessary expenditures in duplication of cataloging technical reports exists in the technical libraries of the Department of Defense. This duplication can be eliminated by establishing DOD-wide standards for descriptive, subject, and subject code cataloging, and a standard code and dictionary for computer retrieval. The plan proposed presents the framework for solution of the problem and indicates the potential savings to be realized. (Author)

AD-262 958 Div. 32
(15 Sep 61) OTS price $4.00

Office of Aerospace Research, Washington, D. C.
DIRECTORY OF R AND D INFORMATION SYSTEMS. A LISTING OF CENTERS, SERVICES, SOURCES AND SYSTEMS ENGAGED IN COLLECTING, STORING AND DISSEMINATING SCIENTIFIC DATA AND INFORMATION APPLICABLE TO AEROSPACE RESEARCH AND TECHNOLOGY.
Aug 61, 259p. (Rept. no. OAR-1)
Unclassified report

DESCRIPTORS: *Directories, *Documentation, *Data processing systems, *Bibliography, *Scientific research, Data, *Technological intelligence, Space flight, Chemistry, Physics, Mathematics, Biology, Medicine, Materials, Metals, Fuels, Propulsion, Atmosphere, Power.

This volume presents the findings of a survey of information centers, services, sources and systems collecting, storing and distributing information and data useful in Air Force research and development. It includes descriptions of content and services of each system, and brief instructions for their use. Various search methods are provided for locating information sources pertaining to narrow or broad areas of interest. (Author)

AD-263 092 Div. 32
(15 Sep 61) OTS price $19.75

Pennsylvania State U., University Park.
BARGAINING BEHAVIOR: II. EXPERIMENTS IN OLIGOPOLY.
by Lawrence E. Fouraker and Sidney Siegel. Aug 61, 343p. incl. illus. tables.
(Grants NSF-G16423 and Nonr-G00012)
Unclassified report

DESCRIPTORS: *Reasoning, *Economics, Economic conditions, *Group dynamics, Industrial relations, Applied psychology.

33. TRANSPORTATION

No Entries

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

* Descriptors marked with an asterisk will be included in the cumulative indexes.

BIBLIOGRAPHY

AD-260 688 $1.25

Army Signal Research and Development Agency, Fort Monmouth, N. J.
BIBLIOGRAPHY OF USASRDA TECHNICAL PUBLICATIONS 1951-1960. Rept. for 1 Jan 51-31 Dec 60. 1 May 61, 50p. 800 refs.

DESCRIPTORS: *Scientific reports, *Bibliography, Antennas, Electronics, Communication systems, Countermeasures, Electron tubes, Frequency, Control, Human engineering, Meteorology, Photography, Propagation, Radar, Solid state physics, Mathematics, Radio, Test equipment, Wire.

Approximately 800 bibliographic entries are arranged alphabetically by author under 26 major subject divisions covering the various fields of research and development conducted at the agency.

BEHAVIORAL SCIENCES

Human Engineering

PB 181 030 $1.00

Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
WEIGHTLESSNESS AND PERFORMANCE: A REVIEW OF THE LITERATURE, by J. P. Loftus and Lois Reel Hammer. Rept. on Human Performance in Advanced Systems. June 61, 40p. 125 refs. ASD Technical rept. 61-166.

DESCRIPTORS: *Weightlessness, *Physiology, Psychometrics, *Human engineering, *Space flight, Bibliography.

The implications of weightlessness as encountered in space flight are discussed, and the known research dealing with the psychological and physiological effects of zero gravity is critically reviewed. Topics are grouped under the headings of orientation, psychomotor performance, and physiological functions, with a special section on methods of reseach. The major problem area indicated is the effect of weightlessness on gravity oriented sensory mechanisms, particularly the vestibular apparatus, and consequently on both physiological functions and psychomotor performance. An extensive bibliography is included. (Author)

PB 156 828 $1.60

Biotechnology Lab., U. of California, Los Angeles.
AN ASSESSMENT OF PROBABILITY DISTRIBUTION OF SINGLE OCCURRENCE IN COMBINATION WITH RELEVANT AND IRRELEVANT CUES FOR MASSED PRACTICE AND TRANSFER OF TRAINING, by Kenneth Ziedman and John Lyman. Technical rept. no. 5 on Observer Practice, Contract Nonr-233(49). Aug 60, 19p. 4 refs. Engineering Dept. rept. no. 60-75.

DESCRIPTORS: Probability, *Transfer of training, Statistical analysis, *Display systems, Human engineering, Tests, *Learning, Motor reactions.

Operator performance on a visual-motor task was tested under three different display/cue conditions and two different probability distributions of signal occurrence. The results showed: (a) A nearly constant performance for both response rate and errors (after an initial five minute warm-up period) for both probability distributions for the 30 minute duration of the run. (b) A different response strategy for the two different probability distributions for about 50% of the subjects. This effect made comparisons between the two conditions difficult. (c) For the random program the highest response rate occurred for the high relevancy condition, the other two conditions being about equal. However, the error measurement showed the high relevancy and high irrelevancy conditions to be equal, both having fewer errors than the low relevancy condition. This is interpreted as indicating that in the context of the experiment the irrelevant condition may actually have provided some relevant cues. (d) The large difference between the low relevancy and high relevancy conditions did not produce a corresponding difference in performance. This suggests that for simple tasks the addition of redundant information has only a small effect on performance. (e) The two criterion measures, errors and response rate, did not show a high correlation and apparently are measuring different aspects of overall performance. (f) The transfer effects between the two programs show an interaction with the display conditions. (Author)

PB 156 827 $2.60

Biotechnology Lab., U. of California, Los Angeles.
DEVELOPMENT AND SPECIFICATIONS OF THE DISPLAY-CUE ANALYZER, by Kenneth Ziedman. Technical rept. no. 4 on Observer Practice, Contract Nonr-233(49). Aug 60, 25p. 1 ref. Engineering Dept. rept. no. 60-73.

DESCRIPTORS: *Display systems, *Human engineering, Control, Programming, Radar operators, Specifications, Radar tracking, Tests.

The equipment described in this report was built to analyze the effects of variations in display cues on operator performance. The basic display consists of a number of small lamps which can be arranged in any desired pattern on a panel. Variation in display cues is achieved by placing thin cardboard sheets over the lamps with different geometrical configurations of cues drawn on the sheet. The operator is provided with response switches. His task is to push the switch which corresponds, in a predetermined fashion, to a given display lamp. The correspondence between lamp and switch can be varied in a number of ways. In addition to the light stimuli, any other stimuli can be used which can

be electrically controlled. An eighteen channel programmer is also described which allows any desired sequence of lamps to be illuminated. The programmer can be stepped from one position to the next by the operator's response (self-paced), by the experimenter (forced paced), or the equipment can be set up for an operant responding situation. Response rate, reaction time, cumulative responses, and errors can be recorded. Future plans for more refined response measures and data analysis are discussed. (Author)

PB 157 718 $3.60

Naval Ordnance Lab., White Oak, Md.
FACTORS AFFECTING SIGNALING BY VISUAL METHODS, by R. D. Dwiggins. 19 Dec 57, 32p. 11 refs. NAVORD rept. 6034; AD-162 931.

DESCRIPTORS: *Visual signals, Visibility, Effectiveness, *Visual thresholds, Determination, Transmission, Luminescence, Physiology, Psychology, Atmosphere, Illumination, Eye, Brightness, Color vision, Test equipment, Optical equipment

The use of visual methods to convey information over relatively large distances has long been practiced. The effectiveness of signaling by these methods depends, fundamentally, upon (1) the physical nature of the signal, (2) the transparency of the atmosphere, (3) the ambient illumination, and (4) the physiological and psychological response involved in seeing. These broad factors are analyzed and discussed in terms of their individual components. This information is presented on the following topics: (1) characteristics of the eye and the seeing process, (2) the effect of brightness contrast on visibility thresholds, (3) luminance thresholds for various colors, (4) relative effectiveness of point sources over diffuse light, (5) values of background luminance under various natural conditions, and (6) the relative effectiveness of a flashing light versus a steady light as a signal. (Author)

AD-259 343 repriced $2.50

North American Aviation, Inc., Downey, Calif.
STUDY IN THE UTILIZATION OF HANDTOOLS IN SPACE, by Harold L. Alexander, G. G. Boruski, and John T. Celentano. Rept. on Contract AF 33(616)6911. 31 Aug 60, 120p. 15 refs. WADD Technical rept. 60-535.

DESCRIPTORS: *Tools, *Astronautics, *Human engineering.

Very little is presently known concerning the adequacy of earth tools as applied to forecasted maintenance and operations actions in the space complex. Such information is important because tasks will develop as man penetrates into space which will require the use of handtools. It is envisioned that extreme conditions will exist in space. Although exact conditions cannot as yet be defined for the space complex, certain broad parameters have been identified to guide the approach. A preliminary effort was therefore initiated to describe the utilization of tools in space. A major problem was identification of the anticipated tasks. Detailed data are provided on problems, career fields, questions of adequacy, individual tool analysis, and experimental investigations. (Author)

PB 155 038 $7.60

Bureau of Naval Personnel, Washington, D. C.
TRAINING AND PROFICIENCY OF AVIATION ELECTRONICS TECHNICIANS. II. PERFORMANCE, PROGRESS AND UTILIZATION OF FIRST ENLISTMENT AVIATION ELECTRONICS TECHNICIANS, by Earl I. Jones and Alvin J. Abrams. Nov 60, 71p. 4 refs. Technical Bulletin 60-15; AD-251 957.

DESCRIPTORS: *Aviation personnel, *Maintenance personnel, *Training, *Military training, Effectiveness, Test equipment, Operation, *Achievement tests, Design, Psychometrics, Test methods, Electronic equipment

The primary indications of the research were that facilities for fleet training were adequate; technicians who had at some time been assigned to non-electronic duties tended to perform at a lower level throughout the first enlistment than technicians who had been assigned only to electronic duties; the assignment of AT's to billets was somewhat inconsistent with the service rating concept; and as AT's progressed in time and rate they performed more technical duties with greater independence, often achieving a level of independent and proficient trouble shooting prior to the termination of their first enlistment. (Author)

PB 155 337 $3.60

Bureau of Naval Personnel, Washington, D. C.
TRAINING AND UTILIZATION OF SONARMEN ASSIGNED TO HELICOPTER ANTI-SUBMARINE SQUADRONS OF THE UNITED STATES PACIFIC FLEET, by Adolph V. Anderson and Edward J. Pickering. Nov 60, 35p. 6 refs. Technical bulletin 60-14; AD-253 102.

DESCRIPTORS: *Sonar personnel, Training, Antisubmarine warfare, Helicopters, Airborne, Maintenance, Sonar equipment, *Military training, Naval personnel, Effectiveness.

The purpose of this project was to obtain information concerning the training and utilization of sonarmen assigned to anti-submarine helicopter squadrons. During May and June of 1959, 139 sonarmen in four Pacific Fleet A/S helicopter squadrons were interviewed. The information obtained from these interviews was analyzed through the use of frequency distributions, percentages, means, and standard deviations. Results of the survey indicate that the training and proficiency level of sonarmen assigned to helicopter squadrons are adequate to meet the demands of their assignments. However, the results also indicate that, in general, helicopter sonarmen spend little time either operating or maintaining sonar equipment. (Author)

PB 155 121 $2.60

Army Chemical Research and Development Labs., Army Chemical Center, Md.
EXPLOSIVE NOISE AND THE MASKING REACTION, by F. N. Craig, E. G. Cummings, and W. V. Blevins. Feb 61, 22p. 10 refs. CRDLR 3057; AD-250 998.

DESCRIPTORS: Toxic agent alarms, Test methods, Reaction (Psychology), *Respiration, *Noise, *Motor reactions, Poisonous gases, Inhibition, Countermeasures, Auditory signals, *Breathing masks

In the laboratory it had been observed previously that men instructed to cease breathing at the sound of a buzzer would often involuntarily take an additional breath in response to the sudden noise. In the present experiments breathing was recorded during the masking reaction in the field, explosions of Primacord being used as signals to mask in some instances. Review of the records made previously in tne laboratory by men walking on the treadmill revealed that the incidence of respiratory startle responses to the buzzer was reduced to less than 20% when the men were told to fall to the prone position at the time at which they began to hold their breaths. This low incidence of the response to sudden noise is not increased when men walking along a trail perform the masking reaction in response to a command or an explosive noise. When direct comparisons are made on the same group of men, the use of an explosive alarm instead of a command as a signal to mask does not increase the volume inhaled during the masking reaction. In a group of men having received brief indoctrination, the volume inhaled in the masking reaction may range from zero in a substantial fraction of the men to as much as 11 liters. (Author)

PB 157 737 $5.60

Fordham U., New York.
THE DETERMINATION OF THE DEGREE OF INTERACTION BETWEEN AUDITORY AND VISUAL SENSE THRESHOLDS, by C. Thomas Goldsmith. Final rept. 1 Apr 56-1 June 58, on Contract DA 30-069-ORD-1758. 1958, 57p. 14 refs. AD-207 448

DESCRIPTORS: Determination, *Auditory thresholds, *Visual thresholds, *Sensory perception, Mathematical prediction, Statistical analysis.

Visual and auditory thresholds do not vary independently. The extent of the concomitant variability is so slight that it cannot be detected in individual subjects due to their natural day-to-day variability. This probably explains discrepancies found in the literature. Subjects respond in various modes, but all respond "Both" more often than would be expected, probably indicating a something beyond the sensory level. In applied situations, early warning can be facilitated by employing dual channel information presentation. (Author)

PB 158 066 $4.60

Minneapolis.
PSYCHOMETRIC ANALYSIS OF RESPONSE PATTERNS TO INTEREST INVENTORY ITEMS, by David P. Campbell. Technical rept. no. 10 on Contract Nonr-710(17). Nov 60, 50p. 16 refs. AD-247 376.

DESCRIPTORS: *Psychometrics, Behavior, Vocational tests, Attitudes, Measurement

A psychometric analysis was made of answers to the Minnesota Vocational Interest Inventory (MVII). It has 190 triads of statements of activities. The individual is asked to select in each triad one activity liked most and one liked least. The remaining one is left to fall somewhere in between. Three problems were considered: (1) an attempt to scale the items within each triad using the Coombs unfolding scaling technique; (2) the determination of the influence of response set on the MVII; and (3) an exploration of pattern scoring of the MVII. Findings indicate the Coombs model will not work well with triads; thus, subjects should rank four or more statements if this model is going to be used. The results show only a very slight response set. Both individuals and occupational groups seem to choose items on the basis of content, not format. Response pattern counts for each triad were available for specific occupational groups and for a tradesmen-in-general group. This permitted an exploratory comparison of item scoring and pattern scoring. The results showed that item scoring actually scored some patterns positively when the percent response difference between the occupational group and tradesmen-in-general was negative. Pattern scoring does not do this; thus it would seem more precise. (Author)

PB 154 972 $15.00

New York U. Coll. of Engineering, N. Y.
SELECTED ABSTRACTS FROM THE LITERATURE ON STRESS, by Sol Klier, Joseph W. Linskey and others. Rept. on Contract N61339-565. Nov 60, 226p. 397 refs. NAVTRADEVCEN-565-1; AD-253 068.

DESCRIPTORS: *Bibliography, *Stress (Psychology), *Emotions, *Anxiety, Combat fatigue, Behavior, Attitudes.

This report is the results of a comprehensive literature search for information on stress pertinent to the training problem. It provides a source of background information from which specific hypotheses and variables will be delineated for study in a research program aimed at the introduction of stress in training devices and training programs. From the literature on stress and anxiety 397 articles were selected and abstracted. In general, selection was made on the basis of the relevance of the study for determining and/or measuring the effects of stress or anxiety on human behavior. Such topics as the following are included: effects of imposed stress, effects of manifest anxiety, observations of behavior under extreme stress (combat), theoretical conceptualizations of stress, personality attributes of stress, physiological effects of stress, and techniques for determining the presence of a stressful affect. (Author)

PB 157 493 $3.60

Yale U., New Haven, Conn.
COGNITIVE REORGANIZATION FOLLOWING HYPNOTIC MANIPULATION OF ATTITUDINAL AFFECT, by Milton J. Rosenberg. Technical rept. no. 1 on Contract Nonr-609(27). [1960] 32p. 20 refs. AD-245 146.

DESCRIPTORS: *Attitudes, Theory, Test methods, Statistical analysis, Reasoning, Psychology, Stability, Hypnosis

Through the use of posthypnotic suggestion it was possible to produce sizeable alterations in the experimental subjects' expressed and felt affects toward attitude concepts of both high and low interest respectively. These affective alterations significantly exceeded the reliability limits of the affect-measuring instrument, whether those limits are ascertained through the performance of a control group or of the experimental group itself. The production (at least through a hypnotic procedure) of a reversal in affect felt toward an attitude object was followed by significant and consistent changes in the person's beliefs about the object. (Author)

PB 157 494 $3.60

Yale U., New Haven, Conn.
THE DURATION OF INCONSISTENCY-REDUCING COGNITIVE REORGANIZATION IN ATTITUDES, by Milton J. Rosenberg. Technical rept. no. 2 on Contract Nonr-609(27). [1960] 32p. 19 refs. AD-245 147.

DESCRIPTORS: *Attitudes, Test methods, Reasoning, Personality, Psychology, Hypnosis

Contents:
The comparability of the experimental and control groups
Cognitive reorganization in relation to induced affect change
Restoration of original attitude
A two-sequence model of attitude dynamics
The sequence originating in modification of cognition
The sequence originating in modification of affect
Conditions under which consistency is sought
Evaluation of contrary evidence
Mediational aspects of inconsistency reduction

BIOLOGICAL SCIENCES

PB 155 133 $2.60

Brooke Army Medical Center, Fort Sam Houston, Tex.
ENVIRONMENTAL FACTORS IN BURNS. PARTS I - VIII, by Robert W. Sheehy, Arthur D. Mason, Jr. and Lawrence T. Grand. June 60, 29p. MEDEW-RS-3-60; AD-252 285.

DESCRIPTORS: *Burns, Body weight, Oxygen consumption, Survival, Temperature, Tissues (Biology), Deterioration, Skin, Growth, Pathology, Test methods.

Contents:
Weight gain response of closely related postburn rats from different sources
Oxygen consumption postburn in closely related rats from different sources
The effects of burn in the early postburn period in rats
Oxygen consumption in the postpartum rat postburn
Oxygen consumption in the male rat postburn at different environmental temperatures
Postburn mortality and total eschar slough in male and female rats postburn
Oxygen utilization versus ambient temperature
Normal rate of growth curves for male and female rats

Anatomy and Physiology

PB 156 908 $6.60

Army Chemical Research and Development Labs., Army Chemical Center, Md.
REPORT OF TRIP, SEPTEMBER 1958 THROUGH MARCH 1959 AND APRIL 1960 THROUGH SEPTEMBER 1960 IN CONNECTION WITH SECRETARY OF THE ARMY'S RESEARCH AND STUDY FELLOWSHIP, by J. H. Wills. Feb 61, 61p. 38 refs. CRDL Special pub. 2-35; AD-251 148.

DESCRIPTORS: *Medical research, Universities, Physiology, Pathology, Pharmacology, Veterinary medicine, *Biological laboratories, *Medical laboratories, Psychiatry, Biochemistry, *Respiration, *G agents, *Cholinesterase, Inhibition, Test methods, Atropine, Oximes, Brain, Stimulation, *Chemical warfare agents, Therapy.

PB 154 929 $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
VISUAL ACUITY UNDER BLUE ILLUMINATION, by R. T. Mitchell and Rhoda R. Mitchell. Rept. on Contract AF 19(604)7400. 10 Feb 61, 13p. 8 refs. 58G-0018; AD-251 570.

DESCRIPTORS: *Visual acuity, Illumination, Lighting systems, Eye, Display systems, Colors, Tests. Polarizing filters.

Visual acuity was compared under white and blue illuminations of equal intensities. At a viewing distance of 13 inches no difference in performance was found. In two experiments at 10 and 26 feet the angular size of the minimum detail which could be resolved was 40-50% greater with blue light than with white. When observers wore -1.0 diopter lenses at a far distance in the blue condition their acuity was statistically indistinguishable from acuity under white light. The decrease in acuity is ascribed to the axial chromatic aberration of the eye. A blue illuminant typical of selective spectrum lighting systems used with dim cathode ray tubes results in an inducted myopia of .60 diopters corresponding to a far point of 56 inches. Methods of compensating this effect are briefly discussed. (Author)

Biochemistry

TID-12946 $1.60

Bermuda Biological Station, St. George's West, Bermuda.
THE BIOCHEMICAL CIRCULATION OF ELEMENTS IN THE SARGASSO SEA, by John H. Ryther and David W. Menzel. Progress rept. 1 Sep 60-31 Aug 61, on Contract AT(30-1-2646. June 61, 14p.

TID-12906 $3.60

Chicago U., Ill.
THE BIOLOGICAL EFFECTS OF STRESSFUL AGENTS AS RELATED TO DIET, by Willard J. Wisek. Progress rept. on Contract AT(11-1)-670. June 61, 40p.

PB 157 708 $1.10

School of Aviation Medicine, Brooks AFB, Tex.
PYRIDINE NUCLEOTIDE-CYTOCHROME C REDUCTASES IN ACCLIMATIZATION TO COLD, by Baltazar Reynafarje (Institute of Andean Biology) and Rowand R. Chaffee. Dec 59, 3p. 6 refs. Rept. 60-7; AD-233 208.

DESCRIPTORS: *Pyridines, Enzymes, Biochemistry, Climatic factors, *Cytochrome C, *Exposure, *Nucleotides.

Pharmacology and Toxicology

PB 156 363 $2.60

Army Chemical Research and Development Labs., Army Chemical Center, Md.
RESPONSES OF ANIMALS INHALING DECOMPOSITION PRODUCTS OF SIX LUBRICATING OILS, by Theophilus R. Carson, Edward J. Donati and Leo Feinsilver. Feb 61, 21p. 11 refs. CRDLR 3039; AD-251 846.

DESCRIPTORS: *Lubricants, Heat treatment, *Pyrolysis, Decomposition, Toxicity, Tests, *Aerosols, Chemical properties, Physical properties, Pathology.

Rats and dogs were exposed for 4 hours to aerosols of six lubricating oils either unheated or pyrolyzed at temperatures ranging from 400 F to 1560 F. The oils tested were WF-134, WF-160, WF-179, WF-180, WF-182, and WF-183. On the basis of the mortalities they produced at 1020 F, the order of decreasing toxicity of the oils was WF-183 (the most toxic), WF-179, WF-160, WF-182, WF-134, and WF-180. (Author)

PB 171 991 $0.50

Kansas U. School of Pharmacy, Lawrence.
THE DOSE-EFFECT AND DURATION OF ACTION OF PHENOBARBITAL, MEPROBAMATE, CHLORPROMAZINE, AND OXANAMIDE ON MOTOR AND PSYCHOMOTOR PERFORMANCE, by Duane G. Wenzel. Rept. on Contract Nonr-583(09). 15 Nov 60, 8p. 11 refs. AD-246 548.

DESCRIPTORS: *Chlorpromazine, *Drugs, *Tranquilizing drugs, *Psychomotor tests, *Motor reactions, *Reaction time, Dosage, Test methods, Barbiturates, Anxiety, Control

As it was felt that certain trends toward stimulant-induced impairment might be averted through the use of tranquilizers, phenobarbital, meprobamate, chlorpromazine, and oxanamine were employed in the same tests earlier used in a stimulant study (AD-230 246). The tests consisted of 5 second and 60 second tapping rates, visual reaction time, a complex reaction time involving a simple decision, and a pursuit meter test. Different dosages were used with each drug. It was concluded that the tranquilizers and barbiturates employed at the times and doses tested did not significantly affect performance as evaluated by the tests employed. The only significant value in the entire study was an improvement in the visual reaction time with chlorpromazine, 30 mg., at the two hour test period. It was felt that the standard performance tests used may not be sufficiently sensitive to measure effects produced by moderate (the usual clinical) doses of tranquilizers and by doses of phenobarbital employed as a sedative.

Radiobiology

BNL-5441 $1.60

Brookhaven National Lab., Upton, N. Y.
THE LONG TERM SOMATIC EFFECT OF RADIATION WITH EMPHASIS ON LEUKEMIA, by Eugene P. Cronkite. July 61, 16p.

BNL-5451 $4.60

Brookhaven National Lab., Upton, N. Y.
A PHYSICIAN'S CONSIDERATION OF CRITERIA OF NUCLEAR REACTORS FOR MEDICAL THERAPY AND RESEARCH, by Lee E. Farr. 24 July 61, 45p.

TID-13215 $1.60

Chicago U., Ill.
AEC MICROBEAM PROJECT. Final rept. for ten year period ending 31 Mar 61 on Contract AT(11-1)-115. July 61, 14p.

TID-13393 $11.00

Colorado State U., Fort Collins.
THE EFFECT OF X-IRRADIATION ON EMBRYONIC HEMATOPOIETIC TISSUE. Final rept. on Contract AT(11-1)-597. 147p.

HW-SA-2206 $1.60

Hanford Atomic Products Operation, Richland, Wash.
THE DETERMINATION OF GOLD IN BLOOD WITHOUT CHEMICAL SEPARATION BY THE USE OF NEUTRON ACTIVATION AND SCINTILLATION SPECTROMETRY, by R. N. Diebel and A. B. Garrett. July 61, 14p.

HW-68533 $1.75

Hanford Atomic Products Operation, Richland, Wash.
RADIOLOGICAL CHEMISTRY OPERATION, by J. M. Nielsen. Annual rept. on Contract AT(45-1)-1350. Jan 61, 71p.

TID-13218 $2.60

Iowa State U., Ames.
GENETIC EFFECT OF IRRADIATING SWINE. Progress rept. no. 2 on Contract AT(11-1)-707. July 61, 30p.

LA-2569 $1.60

Los Alamos Scientific Lab., N. Mex.
NEUTRON TISSUE DOSE RATE SURVEY FOR THE GODIVA II CRITICAL ASSEMBLY, by Morris J. Engelke, Edwin A. Bemis, Jr. and J. A. Sayeg. Rept. on Contract W-7405-eng-36. 5 Aug 61, 15p.

TID-13167 $8.60

Nebraska U., Lincoln.
EVALUATION OF EFFECTS OF RADIATIONS ON QUANTITATIVE CHARACTERS IN CORN AND SOYBEANS, by C. O. Gardner, D. G. Hanway, and J. H. Williams. Final rept. on Contract AT(11-1)-352. [1961] 93p.

PB 155 676 $1.60

Oak Ridge National Lab., Tenn.
IONIZING RADIATION AND AGING, by A. C. Upton. Nov 60, 13p. 72 refs. AFSAM 61-8; AD-254 063.

DESCRIPTORS: *Aging, Radiation effects, Dose rate, Animals, Rodents, Mutations, Theory, Survival, Pathology, Physiology.

Life span in rodents is reduced by whole-body irradiation, the extent of life shortening varying in relation to the amount of radiation absorbed and the dose rate. Reduction in longevity is not attributable to any one cause of death but is correlated with premature onset of neoplastic and nonneoplastic diseases otherwise associated with senescence. Since not all age-dependent changes are similarly affected, the incidence and severity of various diseases differing with the radiation dose, irradiation does not simply advance the onset of senescence, unless it is inferred that the aging of different organs is advanced to different degrees.

DP-329 $1.60

Savannah River Lab., Aiken, S. C.
A SYNOPSIS OF STUDIES RELATED TO TRITIUM MONITORING AND PERSONNEL PROTECTIVE TECHNIQUES, comp. by Harry L. Butler and Robert W. Van Wyck. Rept. on Contract AT(07-2)-1. Feb 59, 17p.

ORO-415 $1.60

Virginia U. School of Medicine, Charlottesville.
THE METABOLIC EXCHANGE OF RADIOACTIVE ISOTOPES IN ISOLATED CELL SYSTEMS, by Chalmers L. Gammill and D. R.H. Gourley. Final rept. on Contract AT(40-1)-263. 31 May 61, 19p.

CHEMISTRY

NAA-SR-6253 $1.60

Atomics International, Canoga Park, Calif.
POLAROGRAPHY OF BISMUTH IN MOLTEN BISMUTH(III) CHLORIDE, by L. E. Topol and R. A. Osteryoung. Rept. on Contract AT(11-1)-GEN-8. July 61, 17p.

AD-256 751 repriced $1.75

Eagle-Picher [Research Labs.] Miami, Okla.
PREPARATION OF ELECTRONIC GRADE SILICON VIA THE IODIDE PROCESS, by John T. Buford. Final rept. for 1 Oct 57-15 Mar 61, on Contract AF 19(604)3057. [1961] 69p. 4 refs. AFCRL-192.

DESCRIPTORS: *Silicon compounds, *Iodides, *Silicon, Synthesis, Purification, Zone melting, Dissociation, Processing, Transistors, Fractionation, Semiconductors, Chemical impurities, Single crystals, Preparation

The development of the synthesis process for silicon tetraiodide, and the subsequent purification processes are described. The thermal dissociation systems for silicon tetraiodide utilizing silicon or quartz substrates, or a combination of the two, are described. The development of a continuous system for the preparation of electronic grade silicon via the iodide is presented. The system includes the processes of synthesis, primary purification by distillation, zone melting and thermal dissociation of silicon tetraiodide. The purification factors obtained in the process, as determined by the base boron level of the silicon produced, are presented. (Author)

APEX-699 $2.00

General Electric Co., Cincinnati, Ohio.
FORMATION OF ALUMINA COATINGS ON BERYLLIA BY A VAPOR DEPOSITION PROCESS, by G. R. VanHouten, J. F. White, and J. M. Botje. Rept. on Contracts AF33(600)-38062 and AT(11-1)-171. June 61, 76p.

APEX-637 $1.00

General Electric Co., Cincinnati, Ohio.
URANIUM-BERYLLIUM-HYDROGEN SYSTEMS, AN EXPERIMENTAL STUDY, by D. H. Fraembs. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. July 61, 41p.

TID-13166 $8.60

New Mexico U., Albuquerque.
THE DILUTE SOLUTION CHEMISTRY OF ANTIMONY, by Kent H. Jones. 1960, 96p.

NYO-8770 $14.00

Rutgers State U., Newark, N. J.
SEPARATION AND EXCHANGE OF ISOTOPES, by W. Spindel. Annual progress rept. 1 July 60-15 June 61 on Contract AT(30-1)-2250. June 61, 208p.

Analytical Chemistry

BMI-1538 $1.00

Battelle Memorial Inst., Columbus, Ohio.
DETERMINATION OF OXYGEN IN SODIUM AT CONCENTRATIONS BELOW 10 PPM, by Daniel R. Grieser, George G. Cocks and others. Rept. on Contract W-7405-eng-92. Aug 61, 39p.

HW-27400 $1.60

Hanford Atomic Products Operation, Richland, Wash.
THE DETERMINATION OF FLUORIDE IN PLUTONIUM METAL BY THORIUM TITRATION, by W. S. Ferguson and D. M. Newell. Rept. on Contract W-31-109-eng-52. May 54, 16p.

HW-SA-2208 $2.60

Hanford Atomic Products Operation, Richland, Wash.
THE DETERMINATION OF THORIUM ISOTOPIC RATIOS BY RADIO-CHEMICAL METHODS, by W. Y. Matsumoto. July 61, 21p.

HW-SA-2195 $1.10

Hanford Atomic Products Operation, Richland, Wash.
THE FLAME PHOTOMETRIC AND EMISSION SPECTROGRAPHIC DETERMINATION OF CERIUM, NEODYMIUM AND THE ALKALINE EARTHS, by R. Ko, A. C. Leaf and others [1961] 7p.

HW-60278 $1.60

Hanford Atomic Products Operation, Richland, Wash.
NITROUS ACID BEHAVIOR IN PUREX SYSTEMS, by L. L. Burger and M. D. Money. Rept. on Contract AT(45-1)-1350. 1 May 59, 21p.

HW-SA-2205 $1.10

Hanford Atomic Products Operation, Richland, Wash.
THE SEQUENTIAL DETERMINATION OF LEAD, STRONTIUM, AND ZIRCONIUM BY X-RAY EMISSION SPECTROMETRY, by H. A. Treibs. July 61, 7p.

AD-259 060 repriced $2.75

Metal Hydrides, Inc., Beverly, Mass.
SPECTROGRAPHIC ANALYSIS OF SEMICONDUCTOR AND RELATED MATERIALS, by James M. Morris. Final rept. on Contract AF 19(604)3469. 14 Mar 61, 121p. 1316 refs. AFCRL-369.

DESCRIPTORS: *Semiconductors, *Spectrographic analysis, Chemical impurities, Impurities, Test methods, *Chemical analysis, Determination, Quantitative analysis, Separation, *Bibliography, Silicon, Sensitivity, Metallic compounds, Salts

This report includes: Bibliography of Analytical Methods for the Determination of Small Amounts of Aluminum, Antimony, Arsenic, Boron, Gallium, Germanium, Indium, Phosphorus and Sulfur in High Purity Silicon, by A. P. Scanzillo.

A survey undertaken for devising rapid methods for the determination of trace impurities in silicon. The elements of greatest interest are antimony, arsenic, boron, gallium, germanium, indium, phosphorus, and sulfur. These elements would not only be likely impurities in silicon, but would also be the most difficult to determine. Although this work was performed in order to develop trace methods for the listed elements, assay methods have also been listed as an aid in studying their chemical properties.

TID-13223 $1.60

Michigan U., Ann Arbor.
RADIOCHEMICAL SEPARATION OF CADMIUM BY AMALGAM EXCHANGE, by J. R. DeVoe, H. W. Nass, and W. W. Meinke. [1961] 16p.

CF-59-6-109 $1.60

Oak Ridge National Lab., Tenn.
AN EVALUATION OF ELECTRO-MACHINING FOR THE ANALYSIS OF METAL SURFACES, by J. H. DeVan. June 59, 11p.

IDO-14556 $8.10

Phillips Petroleum Co., Idaho Falls.
SOLVENT EXTRACTION OF ENRICHED URANIUM, by D. E. Griffin. Apr 56, 128p.

DP-612 $0.50

Savannah River Lab., Aiken, S. C.
A MICRODETERMINATION OF URANIUM IN THORIUM, by R. F. Overman. Rept. on Contract AT(07-2)-1. Aug 61, 16p.

Organic Chemistry

HW-SA-2210 $1.60

Hanford Atomic Products Operation, Richland, Wash.
THE AFFINITY OF HYDROHALIC ACIDS FOR TRI-n-OCTYLAMINE, by Archie S. Wilson and Ned A. Wogman. Rept. on Contract AT(45-1)-1350. July 61, 12p.

HW-63455 $1.10

Hanford Atomic Products Operation, Richland, Wash.
PIPING COMPONENTS FOR ORGANIC COOLANTS, by H. L. Floyd. Final rept. Jan 60, 6p.

HW-70199 $1.10

Hanford Atomic Products Operation, Richland, Wash.
USE TEST COMPARISON OF TBP DILUENTS, by John E. Mendel. Rept. on Contract W-31-109-eng-52. 6 July 61, 10p.

ORO-439 $1.10

Tracerlab, Inc., Boston, Mass.
SYNTHESIS OF COMPOUNDS LABELED WITH ISOTOPIC CARBON. Quarterly rept. no. 3, on Contract AT(40-1)-279. [1950] 10p.

ORO-421 $1.10

Tracerlab, Inc., Boston, Mass.
SYNTHESIS OF COMPOUNDS LABELED WITH ISOTOPIC CARBON. Quarterly rept. no. 4, 1 Apr-30 June 50, on Contract AT(40-1)-279. Aug 50, 11p.

ORO-422 $1.10

Tracerlab, Inc., Boston, Mass.
SYNTHESIS OF ISOTOPICALLY LABELED COMPOUNDS. Quarterly rept. no. 5, 1 July-30 Sep 50, on Contract AT(40-1)-279. [1950] 8p.

ORO-423 $1.10

Tracerlab, Inc., Boston, Mass.
SYNTHESIS OF ISOTOPICALLY LABELED COMPOUNDS. Quarterly rept. no. 6 on Contract AT(40-1)-279. [1950] 8p.

ORO-424 $1.60

Tracerlab, Inc., Boston, Mass.
SYNTHESIS OF ISOTOPICALLY LABELED COMPOUNDS. Quarterly rept. no. 7, 1 Jan-31 Mar 51, on Contract AT(40-1)-279. 13p.

ORO-426 $1.10

Tracerlab, Inc., Boston, Mass.
SYNTHESIS OF ISOTOPICALLY LABELED COMPOUNDS. Quarterly rept. no. 9, 1 July-30 Sep 51, on Contract AT(40-1)-279. 8p.

ORO-427 $1.10

Tracerlab., Inc., Boston, Mass
SYNTHESIS OF ISOTOPICALLY LABELED COMPOUNDS. Quarterly rept. no. 10, 1 Oct-31 Dec 51, Contract AT(40-1)-279. 4p.

ORO-428 $1.10

Tracerlab, Inc., Boston, Mass.
SYNTHESIS OF ISOTOPICALLY LABELED COMPOUNDS. Quarterly rept. no. 11, 1 Jan-31 Mar 52, on Contract AT(40-1)-279. 5p.

ORO-429 $1.10

Tracerlab, Inc., Boston, Mass.
SYNTHESIS OF ISOTOPICALLY LABELED COMPOUNDS. Quarterly rept. no. 12, 1 Apr-30 June 52, on Contract AT(40-1)-279. 10p.

ORO-430 $1.60

Tracerlab, Inc., Boston, Mass.
SYNTHESIS OF ISOTOPICALLY LABELED COMPOUNDS. Quarterly rept. no. 13, 1 July-30 Sep 52, on Contract AT(40-1)-279. 14p.

ORO-431 $2.60

Tracerlab, Inc., Boston, Mass.
SYNTHESIS OF ISOTOPICALLY LABELED COMPOUNDS. Quarterly rept. no. 14, 1 Oct-31 Dec 52, on Contract AT(40-1)-279. 22p.

ORO-432 $1.10

Tracerlab, Inc., Boston, Mass.
SYNTHESIS OF ISOTOPICALLY LABELED COMPOUNDS. Final rept. 1 July 49-31 Dec 52, on Contract AT(40-1)-279. 5p.

Physical Chemistry

AD-258 229 repriced $3.00

AeroChem Research Labs., Inc., Princeton, N. J.
IONS IN FLAMES. MECHANISMS OF PRODUCTION AND REMOVAL OF ELECTRONS IN FLAMES, by H. F. Calcote. Final rept. on Contract AF 04(647)157. Dec 60, 159p. 61 refs. AeroChem TP-24; supersedes AeroChem TP-7, 11, 12, and 17; AFBMD-TR-61-54.

DESCRIPTORS: Rocket fuels, *Flames, Reaction kinetics, Ionization, Gas ionization, Electrons, *Ions, *Exhaust gases, *Exhaust flames, Mass spectrometers, Mass spectroscopy, Radiofrequency, Rocket motors, Fuels, Electromagnetic properties, Thermodynamics, Dissociation, Chemical reactions, Combustion, Acetylenes, Propanes, Hydrocarbons, Ethylenes, Recombination reactions, Pressure, Temperature

The mechanism of ion formation and removal in hydrocarbon and some other flames was studied by Langmuir probes and RF mass spectrometry down to 1 mm Hg. A mass spectrometric technique was developed which permits ion profiles through the flame to be obtained with a high degree of spatial resolution and a minimum disturbance to the flame. The major ion is H30 (+), with C_3H_3(+) being next in concentration. The results were interpreted in terms of chemiionization, e. g., CH + O yields CHO(+) + e(-). The rate of ions/cc x sec) of ion formation in hydrocarbon-air flames (equivalence ratio, R equals 0.88) is about 6 x 10 to the 9th power (p squared), where p is in mm Hg. This reaction is followed by the very rapid ion-molecule reaction: CHO(+) + H_2O yields H_3O(+)+CO, so that the half-life of the initially produced ion is about 10 to the -7th power seconds. The decay of ion concentration downstream from the flame is used to calculate the recombination coefficient which for propane-air (R equals 0. 88) is 2 x 10 to the -7th power cc/sec and independent of pressure.

ARF-2200-12 $5.60

Armour Research Foundation, Chicago 16, Ill.
THE BORON-CARBON SYSTEM, Final technical rept. on Contract AT (11-1)-578, Project Agreement 4. 7 June 61, 52p.

PB 158 318 $11.00

[Army Research Office] Durham, N. C.
THE CHEMISTRY OF SOLID SURFACES. A SYMPOSIUM SPONSORED BY THE OFFICE OF ORDNANCE RESEARCH, U.S. ARMY, 26-27 MARCH 1958, HELD AT DUKE UNIVERSITY, DURHAM, N. C. [1958] 148p. 53 refs. AD-235 207.

DESCRIPTORS: *Surface, Solids, Chemistry, Symposia, Thermodynamics, Adhesion, Adsorption, Surface properties, Gases, Friction, Lubrication

Contents:
Nature of incomplete monolayers from thermodynamic and N. M. R. data, by J. G. Aston and Q. Stottlemeyer
The thermodynamic equilibrium of electrical charges on a surface or at an interface, by Selby M. Skinner
Statistical mechanics of macromolecules at interfaces, by Robert Simha
Orientation and adhesion of monolayers, by Robert L. Patrick
Lubrication and metal transfer, by Marco Petronio
Mechanisms of wear, by I-Ming Feng
Friction and wear at high temperatures, by Ernest Rabinowicz
Chemistry of organic compounds on surfaces of high and low energy, by W. A. Zisman
The mechanism of chemisorption, by P. W. Selwood
Adsorption of polar organic molecules on active metal surfaces, by Hilton A. Smith

PB 157 738 $2.60

Baker, J. T., Chemical Co., Phillipsburg, N. J.
PURIFICATION OF DIMERCAPROL, by F. L. Meinhofer. Final rept. 1 Apr 58-30 June 59, on Contract DA 18-108-405-cml-143. 22 June 59, 22p. 6 refs. AD-226 947.

DESCRIPTORS: Determination, Chloroform, Solvent extraction, Purification, *Glycerols, *Thio radicals, Evaporation, Chromatographic analysis, *Thiols, Propanes, Chemical warfare agents.

Partition chromatography was the only satisfactory analytical procedure for the determination of 1, 2, 3-trimercaptopropane (TSH) in BAL. The purification of BAL by water extraction was carried out by the initial extraction utilizing 8.35 cc of water for each gram of BAL, followed by reextraction of the TSH-rich residue with 11.1 cc of water for each gram of oil. Magnesium sulfate was superior to sodium sulfate as a drying agent, particularly in the drying of chloroform solutions of BAL. The final evaporation procedure for the purification of BAL consisted of water extraction, treatment with ammonium sulfate and extraction with chloroform, drying over magnesium sulfate and distillation at reduced pressure, and the removal of traces of solvent and water. The attempted direct purification of crude BAL by water extraction gave a product low in TSH, but the product contained about 15% of an unidentified product low in TSH, but the product contained about 15% of an unidentified product.

PB 158 139 $6.60

Central Inst. for Industrial Research (Norway).
HIGH TEMPERATURE OXIDATION OF NIOBIUM, by Per Kofstad, Hallstein Kjøllesdal and others. Technical (scientific) note no. 2, 1 Apr 59-31 Mar 60, on Contract AF 61(052)90. Apr 60, 65p. 36 refs. SI Publ. no. 282; AD-239 047.

DESCRIPTORS: *Niobium, Oxidation, Temperature, High temperature research, Pressure, Oxygen, Transformations, Niobium compounds, Oxides, Penetration, Crystal structure.

The oxidation behavior of niobium has been studied in the temperature range 500 - 1200°C and at oxygen pressures of 760, 100, 10, 1, and 0.1 mm of Hg. The work comprises kinetic studies of the oxidation as well as structural investigations of the oxidized specimens by means of X-ray diffraction, electron diffraction, electron microscopy and metallographic techniques. Niobium exhibits an unusual and rather complex oxidation behavior as evidenced by the fact that the oxidation has a highly irregular temperature dependence and is unusually sensitive to changes in the oxygen pressure. Reversals in the temperature coefficient of the oxidation are found in two temperature regions (at about 600 and 800°C) depending upon the oxygen pressure. The complex oxidation behavior is suggested to be due to formation of different Nb_2O_5-modifications in different temperature regions, and to the ability of the oxide to deform plastically and form protecting scales with decreasing oxygen pressure. In addition to oxide scale formation, oxygen is dissolved in the metal during the oxidation. Growth of oxide whiskers consisting of single crystals of α-Nb_2O_5 is found to take place on the oxide surface at temperatures above approximately 800°C. (Author)

PB 156 460 $6.60

De Paul U., Chicago, Ill.
INVESTIGATIONS CONCERNING THE POSSIBLE EXISTENCE OF N, N_2 AND N_3 RADICALS, by Eugene Lieber. Final technical rept. on Contract DA 44-009-eng-3728. 1 Dec 59, 70p. 34 refs. AD-233 804.

DESCRIPTORS: *Nitrogen, Ions, *Azides, Decomposition, Photolysis, Pyrolysis, Organic azides, Lead compounds, Azoles, Disproportionation, Molecular structure, Imides.

A theory for the reactive intermediate of azide behavior: The theory postulates the intermediates for the reaction of hydrazoic acid and covalent azides and for the azide ion. In both cases, the absorption of energy moves the opposite charges further apart, producing a species of greater reactivity. The pentazole ring: A discussion is presented of the possible existence of a five-membered ring consisting entirely of N atoms: Tetravalent lead azide: Studies were made to determine whether the photochemical yellowing of Pb (II) azide may be caused by the photochemical-induced disproportionation leading to tetravalent lead azide (PbN_{12}) and its subsequent breakdown to PbN_6. Synthesis of lead imide: Lead imide was prepared in 93 to 95% yield by the addition of PbI_2 to the liquid NH_3 solution of potassium amide. Although the technique eliminated the handling of the product during synthesis, much difficulty was caused by detonations, even with impure specimens. The cause of the detonations was not determined. Theory on photolysis of sodium azide: It was suggested that the photolysis of NaN_3 is caused by a photon of energy entering the crystal lattice and initiating a series of energy transfers, the ultimate result of which is the release of N from the surface of the crystal.

GAMD-2033 $2.60

Electric Boat Div., General Dynamics Corp., Groton, Conn.
HEAT CONDUCTIVITY OF HELIUM AND CARBON DIOXIDE, by B. Vodar. Final rept. on Contract AT(04-3)-187. 11 Aug 59, 23p. MGCR-PR59-404.

PB 157 871 $6.60

Electro-Optical Systems, Inc., Pasadena, Calif.
RESEARCH ON CHEMICAL REACTIONS CAPABLE OF CONVERTING SOLAR ENERGY INTO FORMS WHICH CAN BE USED AS POWER SOURCES, by John J. Rowlette. Rept. on Solar and New Energy Conversion Techniques, Contract AF 33(616)6546. Aug 60, 68p. 72 refs. ARL Technical note 60-135; AD-247 197.

DESCRIPTORS: *Chemical reactions, *Solar energy, *Power supplies, *Fuel cells, Water, *Photolysis, Electrochemistry, Electrolytic cells, Electrodes, Materials, Hydrazines, Peroxides, Hydrogen compounds, Palladium, Silver, Bromine.

The unsensitized photolysis of water at 1000 degrees C in a palladium-Inconel reaction tube, using a hydrogen discharge lamp as the energy source, was investigated In the absence of photosensitizers, water cannot be photolyzed at 1000 degrees C with separation of the reaction product using a palladium tube of the design employed because of a rapid thermal back reaction of the products before separation can be accomplished. A palladium tube separation study indicated that palladium is not permeable to oxygen at 1000 degrees C and that the method is probably useful for separating hydrogen from oxygen at 1000 degrees C. Also reported is the mercury-sensitized photolysis of water using a low pressure mercury vapor lamp for cases in which steady and pulsed light sources were used. For the case of a continuous light source, a quantum yield of 2 x 10 to the -5 power is observed, assuming that hydrogen is the sole product. No photolysis products are observed with the pulsed light source, either at low or high temperatures. (Author)

PB 154 186 $6.60

Graham, Savage and Associates, Inc., Jenkintown, Pa.
ELECTRODEPOSITION OF SELENIUM FILMS FOR ELECTROPHOTOGRAPHIC PLATES, by H. J. Boyd and H. L. Pinkerton. Final rept 1 May 56-30 June 58, on Contract DA 36-039-sc-71228. [1958] 69p. 9 refs. AD-207 501.

DESCRIPTORS: *Selenium films, Electrodeposition, Photographic plates, Materials, *Electrophotography, Sulfur period elements.

Amorphous selenium has been electroplated in thicknesses up to 30 microns (not limiting) upon a conductive substrate but lacking in the ability to retain a static charge and thus is not suited for use as electrophotographic plates. These deposits are reproducible, uniform and adherent. They vary in appearance from semiglossy to highly glossy black with a red cast. The appearance of the deposit depends upon the conditions under which they are produced. Data and information are given for the investigations leading to the selection of the optimum bath and set of operating conditions for the formation of amorphous selenium. The variables that might possible effect charge retention properties are discussed, and the results obtained from the investigations undertaken to resolve this problem are reported. (Author)

PB 158 022 $1.10

Guggenheim Jet Propulsion Center, Calif. Inst. of Tech., Pasadena.
APPROXIMATE INFRARED EMISSIVITY CALCULATIONS FOR HCl AT ELEVATED TEMPERATURES, by S. S. Penner and L. D. Gray. Technical rept. no. 36 on Contract Nonr-220(03). Nov 60, 7p. 4 refs. AD-250 755.

DESCRIPTORS: *Hydrogen compounds, Chlorides, Electron transitions, Gases, Temperature, *Infrared spectroscopy, *Infrared radiation, Mathematical analysis.

This report will not reproduce well.

HW-67830 $1.60

Hanford Atomic Products Operation, Richland, Wash.
ADSORPTION OF STRONTIUM BY SOILS UNDER SATURATED AND UNSATURATED CONDITIONS, by K. C. Knoll. Rept. on Contract AT(45-1)-1350. Dec 60, 13p.

HW-SA-2204 $1.10

Hanford Atomic Products Operation, Richland, Wash.
THE EQUILIBRIUM CONTROLLED REDUCTION OF URANIUM CHLORIDE BY MOLTEN ALUMINUM IN A FUSED SALT SOLVENT, by R. H. Moore. Rept. on Contract AT(45-1)-1350. June 61, 8p.

HW-63855 $1.60

Hanford Atomic Products Operation, Richland, Wash.
GAS-GRAPHITE REACTIONS. I THERMAL AND MICROWAVE OXIDATION OF VARIOUS REACTOR-GRADE GRAPHITES, by T. J. Clark. Feb 60, 20p.

TID-12998 $1.10

Hughes Research Labs., Malibu, Calif.
STUDIES OF H_2^+ DISSOCIATION, by A. W. Ehler. Quarterly progress rept. no. 2, 15 Feb 61-14 May 61, on Contract AT(04-3)-362. May 61, 5p.

TID-13493 $1.10

Hughes Research Labs., Malibu, Calif.
STUDIES OF H_2^+ DISSOCIATION, by A. W. Ehler. Quarterly progress rept. no. 3, 15 May-14 Aug 61, on Contract AT(04-3)-362. Aug 61, 4p.

TID-13345 $4.60

Institute for the Study of Rate Processes, U. of Utah, Salt Lake City.
A STUDY OF THE SURFACE CHEMISTRY BEHAVIOR OF LEAD BY STRAIN ELECTROMETRY, by Charles R. Brinkman and Milton E. Wadsworth. Technical rept. no. 40 on Contract AT(11-1)-82. June 61, 49p.

UCRL-6372 $4.60

Lawrence Radiation Lab., U. of California, Livermore.
ELECTRIC AND MAGNETIC DISSOCIATION OF MOLECULAR IONS AND NEUTRAL ATOMS, by John R. Hiskes. Rept. on Contract W-7405-eng-48. June 61, 42p.

TID-12898 $2.60

Michigan U., Ann Arbor.
AN ADSORPTION-CONTROLLED ANODIC PROCESS AT THE GRAPHITE ELECTRODE: APPLICATION TO THE DETERMINATION OF MINUTE AMOUNTS OF NONIONIC SURFACTANTS, by Phillip J. Elving and David L. Smith. Rept. on Contract AT(11-1)-70. May 61, 26p.

TID-13302 $1.60

Minnesota U., Minneapolis.
DIFFUSION STUDIES IN LIQUID METALS, by Richard A. Swalin. Progress rept. 1 Nov 60-30 June 61, on Contract AT(11-1)-841. 29 July 61, 11p.

PB 161 611 $1.75

National Bureau of Standards, Boulder, Colo.
A COMPILATION OF THE PHYSICAL EQUILIBRIA AND RELATED PROPERTIES OF THE HYDROGEN-NITROGEN SYSTEM, by D. E. Drayer and T. M. Flynn. May 61, 71p. 250 refs. Technical note no. 110.

DESCRIPTORS: *Hydrogen, *Nitrogen, Vapors, Liquids, *Chemical equilibrium, *Thermodynamics, Physical properties, Transport properties, Vapor pressure, Bibliography.

Published data have been used to calculate K factors for the hydrogen-nitrogen system over the liquid-vapor range of 68.2 to 122.2°K, and 10 to 225 atmospheres. K factors are presented graphically for eleven isotherms within this range. Published data on the solid-gas and solid-liquid regions are presented separately as composition versus pressure at constant temperature. A bibliography of 250 references pertaining to the hydrogen-nitrogen system is included. (Author)

CF-61-3-141 $5.60

Oak Ridge National Lab., Tenn.
CHEMICAL TECHNOLOGY DIVISION. CHEMICAL DEVELOPMENT SECTION C. Progress rept. for Feb-Mar 61, by K. B. Brown. 15 Aug 61, 54p.

CF-61-6-112 $1.60

Oak Ridge National Lab., Tenn.
VAPOR SOLUTION AND CONDENSATION IN MECHANICAL VACUUM PUMP OILS, by F. A. Knox. June 61, 15p.

TID-13188 $1.10

Ohio State U., Columbus.
TERMINAL RESEARCH PROGRESS REPORT ON CONTRACT AT(11-1)-555, by W. B. Smith. May 61, 7p.

TID-13337 $4.60

Ohio U., Athens.
TECHNICAL PROGRESS REPORT, by James Y. Tong. Rept. on Contract AT(11-1)-687. Aug 61, 47p.

PB 157 872 $4.60

Physics, Engineering, Chemistry Corp., Boulder, Colo.
THE PHOTOCHEMICAL DECOMPOSITION OF WATER, by Ronald E. West. Rept. on Solar and New Energy Conversion Techniques, Contract AF 33(616)6529. Oct 60, 42p. 21 refs. ARL Technical rept. 60-325; AD-249 381.

DESCRIPTORS: *Water, *Photochemical reactions, Decomposition, Solutions, Radiation effects, Mercury lamps, Electric arcs, Salts, Perchlorates, Ultraviolet radiation, Solar energy.

Solutions of the perchlorate salts or several cations have been irradiated with the unfiltered radiation of mercury arc lamps to compare their relative abilities to sensitize the photochemical decomposition of water to hydrogen and oxygen. This reaction is potentially applicable to the utilization of solar energy if it can be carried out efficiently. The ceric, cerous, cupric, ferric, ferrous, manganous, thallic and uranyl cations were irradiated using five different lamp-reactor systems. All but thallic and uranyl produced gas under the conditions used. Only ceric gave consistent qualitative and quantitative results when used in different lamps. The reasons for the inconsistency with the other cations are not clear. The cupric ion gave perhaps the most interesting results, and warrants further study. Under the best conditions, cupric perchlorate produced both hydrogen and oxygen with a quantum yield about 1000 times greater than the only previously reported value for the simultaneous evolution of both gases. The generally low quantum yields obtained under the conditions of this work indicate no immediate applicability of this reaction to the utilization of solar energy. (Author)

AD-258 774 repriced $3.00

Rensselaer Polytechnic Inst., Troy, N. Y.
BIBLIOGRAPHY ON MOLTEN SALTS, by George J. Janz. Technical rept. no. 2 on Contract AF 49(638)978. 2nd ed. Mar 61, 179p. 2000 refs. AFOSR-786.

DESCRIPTORS: *Salts, Melting, *Bibliography, High temperature research, Electrochemistry, Electrolytic cells, Solutions, Thermodynamics, Thermochemistry

A compilation is presented of references to published contributions in the area of molten salts from 1833 to 1960. The compilation is arranged first chronologically and then alphabetically by author. An author index is included with an indication of the page numbers on which the corresponding references are located.

NYO-9694 $4.60

Rensselaer Polytechnic Inst., Troy, N. Y.
INORGANIC ELECTROLYTES IN ANHYDROUS ACETONITRILE, by George J. Janz and Arthur E. Marcinkowsky. Technical rept. 6 on Contract AT(30-1)-1999. July 61, 41p.

TID-13426 $10.10

Vitro Labs., West Orange, N. J.
RESEARCH AND DEVELOPMENT STUDIES ON WASTE STORAGE PROCESS, by M. H. Ortner, C. J. Anderson, and P. F. Campbell. Final rept. on Contract AT(10-1)-205. 31 Aug 59, 128p.

EARTH SCIENCES

PB 155 350 $3.60

Airview Specialists Corp., Pleasant Hill, Calif.
PROPOSAL FOR FEASIBILITY STUDY OF AUTOMATION OF RECONNAISSANCE SENSOR MATERIALS. [1960]. 39p.

DESCRIPTORS: Automation, Data storage systems, Classification, *Aerial reconnaissance, *Photographic intelligence, Mapping, *Target recognition, Coding, Information theory, *Military operations.

PB 154 283 $9.10

Lockheed Aircraft Corp., Sunnyvale, Calif.
OCEANOGRAPHIC INSTRUMENTATION: SALINITY, TEMPERATURE AND SOUND VELOCITY MEASUREMENTS. AN ANNOTATED BIBLIOGRAPHY, by A. A. Beltran. Sep 60, 104p. 208 refs. Special Research Bibliography SRB-60-7; AD-245 391.

DESCRIPTORS: *Oceanographical data, Measurement, Instrumentation, Salinity, Temperature, Underwater sound, Velocity, Bibliography

The annotated bibliography of 208 references is primarily concerned with electronic instruments for measurement of salinity, temperature, and sound velocity in the deep ocean. Other equipment and instruments were included when their design or use was applicable to these measurements. For ease in locating items, the bibliography is divided into 5 categories: general oceanography; oceanographic equipment; sea water; underwater sound; and early Japanese literature. A subject index is included. (Author)

Climatology and Meteorology

PB 154 200 $6.60

Chicago U., Ill.
MESOMETEROLOGICAL STUDY OF SELECTED AREAS IN THE UNITED STATES, by Tetsuya Fujita and Henry A. Brown. Quarterly technical rept. no. 5, 1 May-31 July 60, on Contract DA 36-039-sc-78901. [1960] 63p. 11 refs. AD-245 029.

DESCRIPTORS: *Atmosphere, Motion, Turbulence, Thunderclouds, Storms, *Meteorological data, Wind, Telemetering data *Weather stations, *Air mass analysis, *Weather forecasting.

The results of two analyses using mesometeorological techniques are given. Data for the two cases were provided by the New Jersey Microbarograph Network and the Dugway Proving Ground Network. Areas of the analyses were extended through use of the regular U. S. Weather Bureau Observation Network. Results of the New Jersey analysis indicated the origin of mesosystems their development, dissipation, and the horizontal dimensions of the systems at various stages of their lives. Characteristics of the mesosystems during each phase of their development were also noted. The analysis of the Dugway Network data graphically revealed the passage of a mesosystem through the area. Streamline analyses and data sheets of the network stations revealed the time and space changes that occurred. (Author)

PB 155 245 $4.60

Chicago U., Ill.
MESOMETEROLOGICAL STUDY OF SELECTED AREAS IN THE UNITED STATES, by Henry A. Brown and Joseph L. Goldman. Quarterly technical rept. no. 6, 1 Aug-31 Oct 60, on Contract DA 36-039-sc-78901. [1960] 44p. 11 refs. AD-249 550.

DESCRIPTORS: Arizona, *Weather forecasting, *Atmosphere, Motion, Meteorological data, Wind, *Weather stations, *Air mass analysis.

Results of an analysis of data collected by the U. S. Army Electronic Proving Ground surface network at Fort Huachuca, Arizona, on July 14-15, 1958, reveal a surprising degree of organization in convective activity. The case represents a typical situation of the summertime rainy season. The origin of convective activity and its subsequent organization and motion as a mesoscale system is revealed in the analysis. An explanation of the apparent motion of the mesosystems is advanced and the time variation of convective activity over mountains and valleys is noted. A preliminary study of the mesoscale systems of June 4, 1959, in the Texas-Oklahoma area indicates that the systems are less intense than those previously studied. Base maps of the pressure-temperature network, precipitation network, and radar coverage are presented. Two techniques for adjusting surface temperature to mean sea level are studied. The technique developed by Fujita is adjusted to account for meridional differences in insolation. A second technique using the hypsometric relation is developed. (Author) (See also PB 154 200)

AD-258 122 $6.60

Electrical Engineering Research Lab., U. of Texas, Austin.
RESEARCH IN TROPICAL METEOROLOGY, by Wilfried H. Portig, Virgil C. Kowalik, and John R. Gerhardt. Quarterly technical rept. no. 2, 1 Jan-31 Mar 61, on Contract DA 36-039-sc-84937. [1961] 86p. 6 refs.

This report released by the cognizant military agency for sale to the public 26 Sep 61.

DESCRIPTORS: *Meteorology, Tropical regions, *Protective clothing, Protective coverings, Head, Africa, Meteorological data, Meteorological charts, *Cyclones, Caribbean Sea, Helmets.

A preliminary study of meteorological conditions which necessitate protection of the head is reported. The use

of the Tropical Helmet is a matter of concern in many areas and this analysis attempts to show the possibility of a more substantial attack on the problem. Radiational gains of a standing human are compared to that of an upright cylindrical solid. Difficulties and limitations are presented and suggestions for a more thorough investigation are enumerated. Certain small lows are classified as whirls and a pilot study of the period 4-13 4-13 May 1959 is reported. Descriptions of the formation, life, dissipation and effects of these whirls are given. Although the major investigation was of the upper air levels the effects of these whirls on the surface conditions are reported. Further research activities along this line are suggested. (Author)

AD-258 049 $1.60

Illinois State Water Survey, Urbana.
STUDY ON INTENSITY OF SURFACE PRECIPITATION USING RADAR INSTRUMENTATION, by E. A. Mueller and G. E. Stout. Quarterly technical rept. no. 12, 1 Jan-31 Mar 61, on Contract DA 36-039-sc-75055. [1961] 14p.

This report released by the cognizant military agency for sale to the public 26 Sep 61.

DESCRIPTORS: *Meteorological radar, *Precipitation, Intensity, Measurement, Raindrops, Recording devices, Instrumentation, Radioactive fall-out, Effectiveness, Cameras, Photographic analysis.

Data film was obtained from both of the new raindrop camera installations located in New Jersey and North Carolina. The transmissometer was installed in New Jersey and the first roll of data from this instrument obtained. The Indonesia installation produced 27 rolls of film. Data reduction is proceeding normally with a total of 14 rolls of film measured. An attempt to classify the drop size distribution according to the instability obtained from the upper air soundings was initiated. (Author)

PB 155 031 $11.00

Laboratory of Climatology, Centerton, N. J.
MEASUREMENT OF VERTICAL WINDS IN TYPICAL TERRAIN, by C. W. Thornthwaite, W. J. Superior and others. Final rept. 15 Sep 58-15 Sep 59, on Contract DA 36-039-sc-78168. Sep 59, 147p. 37 refs. AD-232 421.

DESCRIPTORS: *Wind, Measurement, Velocity, *Anemometers, Design, Thermistors.

The work is described on the modification of a heated thermistor wind velocity measuring instrument, the development and testing of a propeller-type vertical wind measuring instrument, and the development of a light-weight, portable, aluminum mast for support of the instruments. Wiring diagrams and calibration curves are included. A summary is presented of observations taken at Centerton, N. J. and attempts to relate the observational record to what is known about the spectrum of turbulence at these levels. (Author)

AD-256 311 $8.60

Laboratory of Climatology, Centerton, N. J.
MEASUREMENT OF VERTICAL WINDS IN TYPICAL TERRAIN, by C. W. Thornthwaite, W. J. Superior and others. Quarterly progress rept. no. 3, 1 Jan-31 Mar 61, on Contract DA 36-039-sc-84940. Apr 61, 114p. 23 refs.

This report released by the cognizant military agency for sale to the public 26 Sep 61.

DESCRIPTORS: *Wind, Vertical indicators, Measurement, *Vertical gust recorders, Terrain, Instrumentation, Mobile, Velocity, *Anemometers.

The development is described of a sensitive anemometer to measure the vertical motion of the air and its use in determining the vertical winds over typical terrains is explained. The use of the vertical anemometer as part of a flux meter system to determine the eddy transport of momentum, sensible heat, and moisture near the earth's surface is discussed. The sensor consists of a three-bladed windmill which will turn at a rate proportional to the magnitude of the vertical component of the wind and which responds equally to updrafts and downdrafts. The vertical anemometer will give time average values of the upward and downward vertical component of the wind, or with a simple modification, it will indicate and record the instantaneous values of the vertical components. The vertical anemometer provides a new basis for determining the fluxes of momentum, heat, and water vapor. The combination of the vertical anemometer, to provide necessary switching and chart advance signals, with a suitable sensor to measure the element under investigation allows the direct measurement of the flux of the element without the need for complicated formulas or theories. One series of vertical wind observations was subjected to power spectrum analysis. The observations confirm that at all observation sites so far investigated the mean value of the vertical motion is not zero; the points exhibit mean upward or downward motion, which must balance out over an area. (Author)

PB 158 061 $1.10

Pittsburgh U., Pa.
THE INTERNAL STRUCTURE OF VIRUSES, by Irwin J. Bendet and Max A. Lauffer. Technical rept. no. 1, 1 May-30 Nov 60, on Contract Nonr-624(12). Nov 60, 5p. AD-250 234.

DESCRIPTORS: *Viruses, Electron microscopy, Bacteriophages, Refractive properties, Enzymes, Nucleic acids, Histology.

PB 155 049 $4.60

Quartermaster Research and Engineering Command, Natick, Mass.
A METHOD OF PREDICTING THE FREQUENCY DISTRIBUTION OF WINDCHILL, by Jane Howe Westbrook. Jan 61, 50p. 23 refs. Technical rept. EP-143; AD-250 548.

DESCRIPTORS: *Wind, Cooling, Frequency, Mathematical prediction, Temperature, Distribution, *Climatic factors, Meteorological data, North America.

Eight years of simultaneous recordings of January Temperature and windspeed from 20 North American stations are used in the development of a method for predicting the percentage of time windchill will lie above or below a given value. A windchill prediction chart is constructed. It combines the Siple nomogram, used to derive the windchill index based on average temperature and windspeed, and the prediction model based on the windchill frequencies. Prediction errors (range 0 - 240 windchill units, with average of 52) produce a skewed distribution with 64% of the errors less than the average. Errors greater than average are concentrated between the 5th and 30th and beyond the 95th percentiles. Magnitude of error increases as the index increases. The reliability of the prediction chart is tested by frequency records from 34 additional stations. Deviations of actual windchill values from the predictions are, on the average, 20 windchill units greater than deviations in the model. The same general pattern of error deviation is observed. (Author)

Geology

TID-13126 $1.10

STUDIES RELATING TO THE DEVELOPMENT OF PROCEDURES FOR THE GEOLOGIC DATING OF CORALS AND OTHER CALCAREOUS MARINE AND TERRESTRIAL MATERIALS. Progress rept. on Contract AT(11-1)-581. 28 June 61, 9p.

UCRL-13008 $5.60

Colorado School of Mines Research Foundation, Inc., Golden.
SOURCES OF INFORMATION ON ROCK PHYSICS, by Lorraine Burgin. Technical rept. May 61, 53p.

Physics of the Atmosphere

TID-12829 $3.60

Air Force Cambridge Research Labs., Bedford, Mass.
VERTICAL PROFILES OF CONDENSATION NUCLEI IN THE STRATOSPHERE, by Christian E. Junge. Jan 60, 35p.

TID-12874 $3.60

General Mills, Inc., Minneapolis, Minn.
UPPER ATMOSPHERE MONITORING. Progress rept. for Apr 61 on Contract AT(11-1)-401. 40p.

PB 156 266 $3.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
PHYSICS OF THE IONIZATIOM PROCESSES IN AIR. PART II. DISSOCIATION AND RECOMBINATION OF IONS. AN ANNOTATED BIBLIOGRAPHY, by George R. Evans. Dec 60, 39p. 76 refs. Special Bibliography SB-60-40; AD-251 358.

DESCRIPTORS: *Bibliography, *Ionization, *Air, Ions, *Gas ionization, Production, Ionosphere, Upper atmosphere.

PB 156 267 $3.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
PHYSICS OF THE IONIZATION PROCESSES IN AIR. PART III. ELECTRON THEORY. AN ANNOTATED BIBLIOGRAPHY, by George R. Evans. Dec 60, 33p. 66 refs. Special Bibliography SB-60-40; AD-251 359.

DESCRIPTORS: *Bibliography, *Ionization, *Air, Ions, *Gas ionization, Production, Ionosphere, Upper atmosphere.

PB 156 268 $5.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
PHYSICS OF THE IONIZATION PROCESSES IN AIR. PART IV. (OTHER) SECONDARY PROSESSES OF IONIZATION. AN ANNOTATED BIBLIOGRAPHY, by George R. Evans. Dec 60, 58p. 128 refs. Special Bibliography SB-60-40; AD-251 509.

DESCRIPTORS: *Bibliography, *Ionization, Air, Ions, Gas ionization, Production, *Ionosphere, Upper atmosphere.

(See also PB 156 267)

PB 157 538 $1.60

Pittsburgh U., Pa.
A NOTE ON POLAR BLACK OUTS, by T. M. Donahue. Technical rept. no. 14 on Capture-Loss and Ionization Cross-Sections of Ions and Neutral Particles, Contract Nonr-624(06). Oct 60, 12p. 9 refs. AD-248 075.

DESCRIPTORS: *Extraterrestrial radio waves, Cosmic rays, Absorption, *Ionosphere, Atmosphere, Twilight, *Ionization, Electron capture, *Radio interference

The nighttime recovery phenomenon associated with the polar absorption event is discussed. Because of scattering and refraction in the troposphere and because of absorption by ozone (Chappuis Bands) appreciable attenuation of visible light occurs during twilight at altitudes far above the surface of the earth. Thus the effective shadow line lies well above the geometrical one.

ENGINEERING

HW-69758 $0.50

Hanford Atomic Products Operation, Richland, Wash.
GROUP TESTING IN 100 PER CENT INSPECTION, by H. E. Hanthorn and J. L. Jaech. Rept. on Contract AT(45-1)-1350. June 61, 20p.

SCTM-11-61-81 $6.60

Sandia Corp., Albuquerque, N. Mex.
A PROPOSED METHOD FOR ESTABLISHING DIMENSIONS AND TOLERANCES, by E. W. Kenderdine. Rept. on Contract AT(29-1)-789. June 61, 62p.

SCTM-136-60(14) $1.60

Sandia Corp., Albuquerque, N. Mex.
SPRING RELEASE MECHANISM, by R. O. Work and F. J. Sparber. July 60, 12p.

Aeronautical Engineering

PB 158 315-1 $6.60

Air Force Flight Test Center, Edwards AFB, Calif.
YL-23 PERFORMANCE EVALUATION, by Raymond L. Johnson and Emil Sturmthal. Aug 60, 68p. AFFTC-TR-60-27; AD-243 551.

DESCRIPTORS: *Liaison planes, *Airplanes, Military aircraft, Configuration, Flight testing, *Boundary layer control, Stability, Stability (Lateral), Stability (Longitudinal), Aerodynamics, Take-off, Landing.

The YL-23 was flight tested by the Air Force Flight Test Center in order to determine performance improvements over the L-23B. Performance of the YL-23 is generally improved over the L-23B. The power required for cruise was reduced by almost 23 percent which resulted in a net improvement of approximately 11 percent in the specific range of the aircraft. Climb performance was not noticeably improved as a result of the modifications incorporated by Mississippi State University. Stability and control characteristics of the aircraft are generally satisfactory in all configurations. (Author)

PB 158 315-2 $10.50

Air Force Flight Test Center, Edwards AFB, Calif.
YL-23 PERFORMANCE EVALUATION, APPENDIX III, by Raymond L. Johnson and Emil Sturmthal. Aug 60, 135p. AFFTC-TR-60-27, App. 3; AD-243 246.

DESCRIPTORS: *Liaison planes, Flight testing, Take-off, Airplane landings, Range.

Contents:
Take-offs
Sawtooth climbs
Continuous climbs
Level flight
Descents
Landings
Range missions

PB 156 288 $10.50

Cornell Aeronautical Lab., Buffalo, N. Y.
REVIEW OF VTOL DESIGN STUDIES, by A. C. Adler and S. A. Harrington. Rept. on Contract DA 44-177-TC-602. Aug 60. 132p. 71 refs. CAL rept. no. BB-1367-H-1; AD-246 160.

DESCRIPTORS: *Vertical take-off planes, Design, *Transport planes, Aircraft, Wings, Military requirements, Ground effect, *Convertible airplanes, Control Stability, Aerial propellers, Aerodynamics, Costs, Stalling

Six design studies were made for TRECOM by five different contractors. The VTOL configurations proposed were: (1) unloaded rotor; (2) tilt wing; (3) tilt wing with flaps; (4) deflected slipstream; (5) rotatable ducted propeller; and (6) fan-in-wing. Since the studies were not performed at the same time nor to exactly the same detailed requirements, Cornell Aeronautical Laboratory was assigned the task of reviewing the studies and presenting a comparison of the capabilities of the different configurations on a common consistent basis and with a consistent degree of accuracy.

PB 171 998 $1.00

Midwest Research Inst. [Kansas City, Mo.].
AUTOMATIC RUNWAY PROFILE MEASURING INSTRUMENTATION AND RUNWAY PROPERTIES. PART I: EQUIPMENT, by D. F. Turner, R. S. Brown, and W. E. Snyder. Rept. for May 59-Apr 60 on Structural Design Criteria, Contract AF 33(616)6512. Feb 61 38p. WADD Technical rept. 60-470, pt. 1

DESCRIPTORS: *Runways, Design, Instrumentation

An instrumentation system has been developed which rapidly measures and records the elevation of the runway. The profile data are recorded in a form which can be used directly by existent data processing facilities at WADD. The system consists of two parts, the collimator which projects a highly collimated light beam down the runway, and a profilometer equipped with a photoelectric sensor. As the profilometer is towed down the runway, the sensor is held centered on the light beam by a servo system. A simple direct drive introduces the profile variations between the surface and the sensor position into a shaft-position-to-digital encoder. The output of the encoder is punched on paper tape. Accuracy and repeatability tests have shown that the profile instrumentation system is capable of accuracies which are well within runway data requirements. (Author)

PB 171 985 $1.25

Southern Research Inst., Birmingham, Ala.
DETERMINATION OF THE MECHANICAL PROPERTIES OF AIRCRAFT-STRUCTURAL MATERIALS AT VERY HIGH TEMPERATURES AFTER RAPID HEATING. PART III. THE EFFECT OF SIMULTANEOUS HEATING AND LOADING ON THE TENSILE PROPERTIES OF TYPICAL STRUCTURAL ALLOYS, by A. Clyde Willhelm and J. Robert Kattus. Rept. for Apr 58-Sep 59 on ICBM Materials, Contract AF 33(616)3494. Nov 60, 44p. 7 refs. WADC Technical rept. 57-649, pt. 3; AD-251 811.

DESCRIPTORS: *Airframes, Materials, *Alloys, Mechanical properties, Tensile properties, High temperature research, Load distribution, Heating, Stresses, Sheets, Stainless steel, Equations of state, Nickel alloys, Time, Chromium alloys, Surface-to-surface, Guided missiles

Three series of experiments were conducted to determine the effects of simultaneous heating and loading on the stress-strain characteristics of some typical structural sheet metals, and to correlate the experimental data with predicted effects based on the concept of a mechanical equation of state. The first series of

experiments was performed on Inconel X nickel-chromium age-hardening alloy and on 17-7 PH/TH 1050 stainless steel. The 17-7 PH and full-hard Type 301 stainless steel were used for the second and third series respectively. Improvements in the experimental method and equipment were sought in each succeeding series. The results of the experiments indicate that although the practical application of the concept of a mechanical equation of state to design problems appears promising on a qualitative basis, improvements in prediction and experimental methods will be required to obtain quantitative confirmation. (Author)

Chemical Engineering

ANL-6381 $2.00

Argonne National Lab., Ill.
A THEORETICAL STUDY OF THE TRANSIENT OPERATION AND STABILITY OF TWO-PHASE NATURAL CIRCULATION LOOPS, by Kermit Garlid, N. R. Amundson, and H. S. Isbin. Rept. on Contract W-31-109-eng-38. June 61, 83p.

GAT-T-947 $1.10

Goodyear Atomic Corp., Portsmouth, Ohio.
DISTILLATION AS A MEANS OF REDUCING THE OIL CONCENTRATION IN CASCADE COOLANT, by N. W. Houston. Rept. on Contract AT(33-2)-1. June 61, 9p.

HW-68636 $1.10

Hanford Atomic Products Operation, Richland, Wash.
AIR PULSER FOR THE H-1 COLUMN, by L. E. Bruns. Mar 61, 8p.

HW-62789 $1.10

Hanford Atomic Products Operation, Richland, Wash.
COMMENTS ON EQUIPMENT FOR A P.R.T.R. WATER QUALITY CONTROL LABORATORY, by H. J. Anderson and R. E. Perey. Rept. on Contract AT(45-1)-1350. Dec 59, 4p.

HW-68931 $1.60

Hanford Atomic Products Operation, Richland, Wash.
RECUPLEX CONTINUOUS DISSOLVER, by L. E. Burns. Mar 61, 14p.

HW-62958 $1.10

Hanford Atomic Products Operation, Richland, Wash.
THE RETENTION OF PARTICLES IN DUCTS TRANSPORTING AEROSOL STREAMS, by A. K. Postma and L. C. Schwendiman. Interim rept. on Contract AT(45-1)-1350. Feb 60, 13p.

HW-66864(Rev.) $1.10

Hanford Atomic Products Operation, Richland, Wash.
TECHNICAL SPECIFICATIONS FOR SOLVENT EXTRACTION COLUMNS IN THE NEW PLUTONIUM RECLAMATION FACILITY CAC-880, by L. E. Bruns. June 61, 7p.

HW-26780 $1.60

Hanford Atomic Productions Operation, Richland, Wash.
TEST OF WATER QUALITY BY IMPINGEMENT, by William C. Houck. Jan 53, 16p.

PB 158 335 $11.50

Institute of Engineering Research, U. of California, Berkeley.
CAUSES AND PREVENTION OF SCALE AND CORROSION IN THERMOCOMPRESSION EQUIPMENT WHEN EMPLOYED FOR THE DISTILLATION OF SEA WATER, by W. F. Langelier, D. H. Caldwell, and W. B. Lawrence. Final rept. on Contract W44-009-eng-499. 15 Aug 50, 155p. 9 refs. Series no. 4, issue no. 14; ATI-87 170.

DESCRIPTORS: *Sea water, Desalination, *Evaporators, Scale, *Corrosion inhibition, Chemical equilibrium, *Heat exchangers, *Compressors.

PB 158 320 $7.60

Johns Hopkins U., Baltimore, Md.
TRANSIENT GAS FLOW IN POROUS MEDIA: THE PRESSURE DECAY PROCESS, by Eric Weger and David B. Greenberg. Final technical rept. on Research on the Transient Response of Porous Media and Packed Beds to Large Thermal and Pressure Fluxes, Contracts DA 36-034-ORD-2353 and DA 36-034-509-ORD-3RD. May 60, 74p. 11 refs. OOR 1534:2; AD-239 406.

DESCRIPTORS: Porous materials, *Porous metals, Gas flow, *Pressure, Solid rocket propellants, Measurement

Results are presented of a study of the pressure decay process in porous sintered metal plugs which was initiated in order to determine the validity of the theoretical solutions for transient gas flow in porous materials at high pressures. Experimental results are compared with those obtained from numerical solutions of the equations. The experimental and computed results showed excellent agreement. A general correlation was obtained which can be used to predict the pressure at a point in the core at any time as a function of the viscous and inertial flow coefficients. It is believed that this correlation is of general validity for pressure decay in sintered metallic media similar in pore structure to the plugs used in the present work. (Author)

UCRL-6509 $1.60

Lawrence Radiation Lab., U. of California, Livermore.
A CIRCULATING LIQUID-NITROGEN-COOLED BAFFLE FOR ULTRA-HIGH VACUUM SYSTEMS, by Alfred R. Taylor. Rept. on Contract W-7405-eng-48. May 61, 15p.

TID-13425 $10.10

Minnesota U., Minneapolis.
A THEORETICAL STUDY OF THE TRANSIENT OPERATION AND STABILITY OF TWO PHASE NATURAL CIRCULATION LOOPS, by Kermit Garlid, N. R. Amundson, and H. S. Isbin. Rept. on Contract AT(11-1)-926. May 61, 128p.

NLCO-785(Del). $11.00

National Lead Co., Cincinnati, Ohio.
SUMMARY TECHNICAL REPORT FOR 1 JANUARY-31 MARCH 1959 on Contract AT(30-1)-1156. Apr 59, declassified, 158p.

PB 158 142 $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
PRELIMINARY DESIGN CALCULATIONS FOR FILTER MATERIAL TESTS WITH RADIOACTIVE DUSTS, by E. H. Enquist. Final rept. 14 Sep 49, declassified. 11p. AD-159(H).

DESCRIPTORS: *Particles, Radioactivity, *Particulate filters, Tests, *Aerosols, Filter papers.

Two types of atomizers used to produce dry aerosols are discussed. Operating conditions and apparatus are suggested for testing the efficiency of filter materials with radioactive dusts. Two models of apparatus for measuring particle size are briefly described. (Author)

ORO-414 $1.60

Stetson U., De Land, Fla.
HIGH TEMPERATURE ELECTROMOTIVE FORCE MEASUREMENTS, by J. V. Vaughen. Research progress rept. on Contract AT(40-1)-2044. June 61, 15p.

Civil Engineering

PB 157 699 $8.60

Armour Research Foundation, Chicago, Ill.
DESIGN AND ANALYSIS OF FOUNDATIONS FOR PROTECTIVE STRUCTURES, by K. E. McKee. Technical rept. on Contract AF 29(601)1161. 15 Oct 59, 96p. 43 refs. ARF no. K150, final rept.; AFSWC-TR-59-56; AD-234 697.

DESCRIPTORS: *Structures, *Soils, Stresses, Load distribution, Design, Analysis, *Failure (Mechanics), Civil engineering.

A combined theoretical and experimental program was conducted to investigate the behavior of foundations under time-dependent loading. The standard theoretical approaches describing soil failure under foundations are reviewed with respect to time-dependent loading. Equations are developed for failure of the soil under spread footings, taking into account inertial effects, pressures on the surface, and time-dependent forces. A method of solution for time-dependent loading on pile foundations is also developed. The experimental work is of two types: (1) static loading of footings to obtain data not normally reported but vital for considering dynamic behavior and (2) limited dynamic loading of footings. The static loading tests supply full information on the load-displacement curves for given footings, establish the properties of the Ottawa sand used in the experimental work, and provide visual descriptions of footing behavior. The dynamic loading tests, in which the loading was achieved by dropping a known weight from a controlled height, supply abundant qualitative but only limited quantitative information. In particular, the observations of dynamic failure as contrasted with the observations of static failure lead to serious questions regarding the assumption that the mode of failure under static loading is descriptive of behavior under rapidly applied (dynamic) loading. (Author)

PB 155 336 $1.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
FEASIBILITY STUDY OF AN ADJUSTABLE CAUSEWAY, by J. J. Hromadik. 1 Mar 61, 18p. Technical note N-405; AD-253 975.

DESCRIPTORS: Military transportation, Design, *Floats, Military bridges, *Floating docks.

An attempt was made to develop a 21-ft wide NL pontoon causeway capable of being end-to-end connected as a means for providing an improved causeway for handling 60-ton loads from LST's to shore. The following effort supports this objective: To investigate methods for providing an adjustable causeway section for use with the 3 x 15 pontoon causeway. Various concepts of adjusting a causeway section length are considered with respect to desirable characteristics. Those having merit are further reviewed to arrive at the most feasible concept. A feasible concept is presented. (Author)

Electrical and Electronic Engineering

PB 150 976

Airborne Instruments Lab., Melville, N. Y.
DEVELOPMENT OF A HIGH-POWER ROTARY JOINT FOR STACKED-BEAM RADAR SYSTEMS, by R. E. Avery, D. B. Hoenig, and H. S. Keen. Final rept. on Contract AF 30(602)1605. Aug 59, declassified 27 Aug 59. 45p. 4 refs. Rept. no. 3928-1; RADC-TR-59-163; AD-229 058.

DESCRIPTORS: *Joints, *Radar equipment, Slip rings, Design, Tests, L-band.

Efforts were made to develop an L-band high-power rotary joint for use in stacked-beam radar systems. Several design approaches were studied. The most successful approach consisted of redesigning the strip-fed low-power rotary joint to withstand high-power operation. A pair of these high-power joints was designed and constructed. These rotary joints operated in the 1220 to 1365 mc range. Breakdown was observed at 2.3 megawatts in air at atmospheric pressure. Power level at breakdown increased to 5 megawatts with the introduction of 10 psi gage pressure. The use of SF_6 without pressurization increased the power level at breakdown to above 10 megawatts. SWR, insertion loss, phase shift, and amplitude wow data are presented for the two rotary joints. Recommendations for improvement in possible applications are presented. (Author)

AD-256 001 $1.60

Airborne Instruments Lab., Inc., Deer Park, L. I., N. Y.
DEVELOPMENT OF C-BAND REACTANCE AMPLIFIER, by J. C. Greene, J. Kliphuis, and J. J. Whelehan. Quarterly progress rept. no. 3, 16 Dec 60-15 Mar 61, on Contract DA 36-039-sc-85359. 15 Apr 61, 20p. Rept. no. 8412-1-3.

This report released by the cognizant military agency for sale to the public 26 Sep 61

DESCRIPTORS: *Amplifiers, C-band, Silicon, Gallium compounds, Arsenides, *Diodes, Design, Noise (Radio), *Microwave amplifiers, Broadband, Tests, Electronic circuits, Temperature, Superhigh frequency

Three final amplifier models were designed, constructed, and tested. Of these models, one was designed to use a gallium arsenide point-contact diode, and the other two were designed to use silicon pill diodes. All three models easily meet the specified performance requirements for room temperature operation. The model using point-contact diode should also provide improved noise performance under refrigerated conditions, but since these diodes are fragile and not yet hermetically sealed, they cannot be relied on for continuous field use. The model using two pill diodes in a balanced circuit configuration proved to be superior in all respects and the field-test models will be based on this unit. (Author)

PB 157 723 $9.60

Amphenol Electronics Corp., Chicago, Ill.
MINIATURE TELEPHONE WIRE TERMINAL, by L. J. Kehl. Final rept. 1 June 56-31 Jan 58, on Contract DA 36-039-sc-72800. [1958] 115p. AD-162 540.

DESCRIPTORS: *Miniature electronic equipment, Telephones, Electric connectors, *Electric wire, Design, Model tests, *Terminal blocks.

The objective of this development was the design of a miniature telephone wire terminal (binding post) for general use in communication equipment.

PB 154 389 $1.10

Antenna Lab., Ohio State U. Research Foundation, Columbus.
ON THE USE OF UNIFORM CIRCULAR ARRAYS TO OBTAIN OMNIDIRECTIONAL PATTERNS. by Ta-Shing Chu. Rept. on Antenna Phenomena Research, Contract DA 36-039-sc-70174. 22 Apr 59, 8p. 7 refs. Rept. 662-29; AD-217-531.

DESCRIPTORS: *Antenna radiation patterns, Control, *Antennas, Design, Mathematical analysis, Polarization, Direction finding

Many omnidirectional antennas are designed in the form of circular arrays of equally-spaced identical elements fed in phase. The term omnidirectional is restricted here to azimuthal patterns, i.e., patterns in the plane of the array. It is the purpose of this study to determine the relationship between the number of radiating elements and the fluctuations in the azimuthal patterns as the radius of the circular array varies. Of particular interest are the conditions under which a good omnidirectional pattern can be obtained from such an array. If there are S identical elements fed in phase so that a rotation of the array through $2\pi/S$ radians about an axis perpendicular to its plane does not alter the appearance of the array, it is evident that each point in the radiation pattern must be repeated (S-1) times. As the number of sources increases, decreasing the angular spacing, it is to be expected that the pattern variation between corresponding points will generally decrease. The influence of the pattern of a single element on the array pattern fluctuation is also of interest. (Author)

PB 158 324-1 $8.60

Arinc Research Corp., Washington, D. C.
TECHNIQUES FOR APPLICATION OF TRANSMITTING TUBES IN MILITARY EQUIPMENT, PART I, by Keith L. Martin and William H. von Alven. Rept. on Contract NObsr-81136. 31 Mar 61, 98p. 10 refs. Publication no. 124-2-223, pt. 1.

DESCRIPTORS: *Electronic equipment, *Electron tubes, *Handbooks, Military requirements, *Military equipment, Triodes, Tetrodes, Pulse generators, Rectifiers, Thyratrons, Clippers.

This handbook is intended as a guide to design engineers in the application of transmitting and power tubes in military electronic equipments. It is hoped that the handbook will help to prevent misapplication of these tubes, a problem arising in large part from a lack of information about the variability in tube properties. Part I is concerned with properties common to most transmitting and power tubes; and the translation of specification requirements into useful application data. (Author)

PB 158 324-2 $18.00

Arinc Research Corp., Washington, D. C.
TECHNIQUES FOR APPLICATION OF TRANSMITTING TUBES IN MILITARY EQUIPMENT, PART II, by Keith L. Martin and William H. von Alven. Rept. on Contract NObsr-81136. 31 Mar 61, 284p. Publication no. 124-2-223, pt. 2.

DESCRIPTORS: *Electronic equipment, *Electron tubes, *Handbooks, Military requirements, *Military equipment, Triodes, Tetrodes, Pulse generators, Rectifiers, Thyratrons, Clippers.

Part II presents application data on 29 tube types appearing on the military preferred list, MIL-STD-200E. Much of this information is drawn from manufacturers' life-test records. (Author) (See also PB 158 324-1)

NAA-SR-M-6284 $2.60

Atomics International, Canoga Park, Calif.
RELIABLE MICROSECOND COINCIDENCE CIRCUIT FOR FAST-SLOW SYSTEMS, by L. S. Beller. 13 Apr 61, 20p.

PB 171 989 $1.00

Bell Telephone Labs., Inc., Whippany, N. J.
ENGINEERING SERVICES ON TRANSISTORS, by D. Leed and O. Kummer. Final rept. 1 May 52-31 Mar 60, on Task 5, Transistor Test Methods, Contracts DA 36-039-sc-5589 and DA 36-039-sc-64618. 31 May 60, 35p. AD-251 325.

DESCRIPTORS: *Transistors, Test methods, Test equipment, Circuits, Impedance, Measurement, *Test sets, Design, Phase measurement, Errors, Germanium, Military equipment

This task involved the formulation of requirements for transistor test equipment and the fabrication of an experimental model or models. The development work was divided into two parts; the development of an insertion loss and phase measurement set covering the 5 to 250 mc range, and the development of jig, auxiliary fixtures, biasing facilities and programming arrangements to adapt the basic set to transistor measurement. Besides providing an instrument for measuring transistor characteristics, the design was guided by a number of other objectives: (1) The set must be useful for measuring general four-terminal networks in addition to transistor devices, (2) Transistor measurements must be possible in the grounded base, emitter, or collector configuration, (3) Small signal measurements are required. This calls for low signal current and voltage magnitudes, and (4) Only a reasonable amount of knob manipulation and manual patching changes should be required in making measurements. (Author)

BNL-5617 $1.10

Brookhaven National Lab., Upton, N. Y.
3 KILOJOULE-5 KILOVOLT FLASH TUBE CAPACITOR CHARGING SUPPLY, by D. Miller and J. P. Palmer. Sep 60, 8p.

BNL-5621 $1.10

Brookhaven National Lab., Upton, N. Y.
4 KV POWER SUPPLY, by D. M. Miller. Apr 61, 7p.

BNL-5618 $1.10

Brookhaven National Lab., Upton, N. Y.
5 KILOVOLT, 1.25 KILOWATT CAPACITOR CHARGING SUPPLY, by D. M. Miller. Apr 61, 5p.

BNL-5619 $1.10

Brookhaven National Lab., Upton, N. Y.
INTEGRATOR AND DIGITIZER - IH-78-1, by R. L. Chase. Apr 61, 5p.

PB 156 061 $2.60

Carnegie Inst. of Tech., Pittsburgh, Pa.
THE EXTREMAL LENGTH OF A NETWORK, by R. J. Duffin. Technical rept. no. 49 on Mathematical Analysis of Electrical and Mechanical Systems, Contract DA 36-061-ORD-490., 1 Mar 61, 28p. 9 refs. Rept. no. CIT-ORD-6D-TR49; OOR rept. no. 223:53; AD-253 665.

DESCRIPTORS: *Electronic circuits, *Electrical networks, *Resistance, Electric currents, Electric potential, Operations research, Surfaces, *Conductors, Mathematical analysis.

The extremal length of a plane region has been studied by Grotzsch, Beurling, and Ahlfors (Princeton University Press, 1960, pp 214-228). Extremal length may be interpreted as electrical resistance and this suggests that the definition of extremal length be extended to networks. This extension is carried out in this paper with the aid of linear programming theory. This leads to a new definition for the resistance of a network and to some new network inequalities. (Author)

TID-13359 $2.60

Chicago U., Ill.
THE CHANNELED IMAGE INTENSIFIER. Quarterly rept. no. 11, Jan-Mar 61 on Contract AT(11-1)-647. Aug 61, 21p.

PB 157 722 $5.60

Collins Radio Co., Cedar Rapids, Iowa.
DESIGN AND DEVELOPMENT OF TRANSISTORIZED POWER SUPPLY FOR RADIO SET AN/VRC-24 (XC-3), by M. W. Caquelin and Paul G. Wulfsberg. Final engineering rept. 28 Mar 58-22 Apr 59, on Contract DA 36-039-sc-75033. [1959] 58p. CER-957; AD-225 630.

DESCRIPTORS: Design, *Power supplies, *Transistors, *Radio communication systems, Switching circuits, Dynamotors, Tests, Radio receivers, Radio transmitters, Very high frequency.

This report covers development work completed during design of the transistorized power supply PP-2121(XC-1)/VR for Radio Set AN/VRC-24(XC-3). The mechanical and electrical design was broken down into eleven phases. Various modifications made during each phase are described in some detail. A brief discussion of the switching circuits tried and their relative merits is included. The report is concluded with a performance comparison between the dynamotor and transistor power supply versions of Radio Set AN/VRC-24. Conclusions and recommendations based on these test results are given. (Author)

PB 154 490 $10.10

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
THE THERMAL DESIGN OF HIGH TEMPERATURE ELECTRONIC PARTS AND EQUIPMENTS, by John B. Coleman. Rept. on Contract NObsr-72531. 1 Apr 59, 125p. 176 refs. Rept no. HF-1053-D-13; AD-228 404.

DESCRIPTORS: *Electronic equipment, Electron tubes, Electron tube sockets, Resistors, Servo motors, Switches, Fuses (Electricity), Relays, *High temperature research, Heat transfer, Design.

The standard books on heat transfer are not very helpful in dealing with electronic equipment, with its many small, closely-packed heat sources and complex geometry. In recent years, literature has appeared dealing with this problem, and reasonably accurate thermal design methods are now available for electronic equipment at temperatures up to about 150°C. It has been

shown in this report that the entire heat transfer picture changes as temperature increases, so that presently used methods cannot safely be extrapolated to 250 or 400°C. New materials are introduced, for which there exists insufficient thermal data. New geometries are found and the effectiveness of the several heat transfer modes changes, requiring careful analysis. Furthermore, the geometry of high-temperature parts and modules is not presently well established, and will be determined to a considerable degree by solutions of the heat transfer problems. (Author)

PB 158 289 $11.00

[Cornell Aeronautical Lab., Inc., Ithaca, N. Y.
DESIGN MANUAL OF METHODS OF LIQUID COOLING ELECTRONIC EQUIPMENT, by James P. Welsh. Rept. no. 6 on Contract NObsr-63043. [1960] 141p. 42 refs. Rept. no. HF-845-D-9; NAVSHIPS 900, 195; AD-240 320.

This manual supplements the previous CAL manuals:
HF-710-D-16, AD-53 100, NAVSHIPS 900, 190 (available from GPO)
HF-710-D-10, ATI-199 257, NAVSHIPS 900, 189 (available from GPO)
HF-845-D-2, AD-49-485, NAVSHIPS 900, 187 (available from GPO)
HF-845-D-8, AD-127 527, NAVSHIPS 900, 192 PB 132 432
HF-845-D-19, AD-202 440, NAVSHIPS 900, 194, PB 140 718

DESCRIPTORS: *Electronic equipment, Liquid cooled, *Cooling, *Heat transfer, Reliability, Design, Heat exchangers, Coolants.

This manual was prepared to aid electronic engineers in the thermal design of reliable electronic equipment. Principles and techniques to be followed in the design of electronic parts, assemblies, and equipments are outlined herein to permit heat transfer by liquid cooling to be reliably achieved. (Author)

PB 156 992 $2.60

David Sarnoff Research Center, Princeton, N. J.
GENERATION OF "COOL" ELECTRONS FOR LOW-NOISE MICROWAVE TUBES, by W. Knauer and F. M. Johnson. Semi-annual rept. no. 1, 1 July-31 Dec 58, on Contract DA 36-039-sc-78151. 15 Jan 59, 21p. 3 refs. AD-216 197.

DESCRIPTORS: *Electron tubes, Cooling, Cathodes (Electron tubes), Cesium, Lithium, Ions, Electron guns, Low frequency, Noise, Plasma physics, Microwave equipment.

A new sealed-in-pump cycle for the electron cooling system was investigated. It utilizes continuous desorption and absorption to provide and remove the cooling gas. Cesium, which had been used up to now to provide the ions in the cooling plasma, had caused some undesirable effects: due to its high vapor pressure it migrates rather readily, causing leakage paths and changes in the work-function of all electrodes. To eliminate these difficulties, a different ion source has now been investigated. It is known as a Kunsman-source and consists of β-eucryptite, emitting lithium ions in the temperature range 1000 to 1350°C. Tests have shown that it is able to release rather impressive amounts of Li^+ -ions over long periods. At present, a combined electron and Li^+ -ion emitter is under investigation. (Author) (See also PB 154 523)

AD-257 333 repriced $0.75

Diamond Ordnance Fuze Labs., Washington, D. C.
DESIGN AND CONSTRUCTION OF A PELTIER TEMPERATURE-CONTROL DEVICE, by L. I. Sochard. 24 Apr 61, 31p. TR-896.

DESCRIPTORS: *Temperature control, *Thermoelectricity, Design, *Materials, Tests, Manufacturing methods.

A study was made of the problems of design and construction of Peltier temperature-control devices for use with Ordnance electronics. The principal features sought were (1) compatibility with conventional power supplies, particularly single-cell electrochemical systems, (2) techniques of assembly that are versatile with respect to physical configurations, and (3) techniques of assembly that are readily adaptable to production. A device for cooling was designed, built, and tested that operates from a supply voltage of 1.5 to 2.0 v at input powers up to about 6 w. Eighteen thermoelectric couples were connected in series electrically and in parallel thermally. Aluminum was used as the structural material, serving as both the base and the temperature-controlled chamber. An anodized layer on the aluminum provided good electrical insulation and thermal contact between the structural materials and thermoelectric elements. The circuit patterns were placed on the anodized layer by printed-circuitry techniques. By using jigs that are adaptable to quantity production, all 72 solder joints connecting the elements in series and to the structural meterials were made in two operations. (Author)

AD-261 593 repriced $0.75

Diamond Ordnance Fuze Labs., Washington, D. C.
ULTRASONIC GRINDING TECHNIQUES IN MICROMINIATURIZATION, by John Krawczyk. 28 July 61, 27p. 8 refs. DOFL rept. no. TR-958.

DESCRIPTORS: *Subminiature electronic equipment, Machining, *Ultrasonic equipment, *Grinders, *Cutting tools, Glass, Ceramic materials, Processing.

Ultrasonic impact grinding techniques are shown to be extremely useful in the fabrication of microcircuit substrates and other specialty component parts. Pertinent parameters of machine operation and tool design are discussed and detailed examples of applications are given. These include the fabrication of: (1) sections of glass only 0.005 in. in thickness, (2) multihole substrates, (3) Hall measurement specimens, (4) tiny toroids, and (5) spiral grooves. (Author)

PB 171 993 $1.50

Digital Computer Lab., U. of Illinois, Urbana.
APPLICATIONS OF TUNNEL DIODES IN SWITCHING CIRCUITS, by Toshiro Kunihiro. Rept. on Contract Nonr-1834(15). 26 Oct 60, 60p. 11 refs. Rept. no. 102; AD-251 142.

DESCRIPTORS: *Diodes, *Switching circuits, Electron tubes, Electronic circuits, Waveform generators, *Digital computers, Mathematical logic, Mathematical analysis, *Trigger circuits.

The general considerations for switching circuits are presented. The methods used to realize the three basic requirements by using tunnel diodes are stated. A set of basic circuits is presented and some experimental results are given. Other miscellaneous applications are added. (Author)

TID-13103 $10.10

Digital Computer Lab., U. of Illinois, Urbana.
VARIATION WITH SIZE OF CHARACTERISTICS OF ELECTRIC CIRCUIT COMPONENTS HAVING GAIN, by John L. Muerle. 19 May 61, 121p. DCL Rept. no. 109.

PB 171 996 $3.00

Emerson Radio and Phonograph Corp., Jersey City, N. J.
R-F AND I-F TRANSFORMERS, MINIATURIZED, FOR TRANSISTORS (WIDE BAND I-F AMPLIFIERS), by Alfred Ossoff. Summary rept. 23 June 59-22 June 60, on Thermionics and Solid State Electronic Technology, Contract AF 33(600)39628. Nov 60, 159p. 7 refs. WADD Technical rept. 60-679.

DESCRIPTORS: *Intermediate frequency amplifiers, *Intermediate frequency transformers, *Transistors, High frequency, Broadband, Circuits, *Capacitors, *Diodes, Design, Tests, *Miniature electronic equipment, Amplifiers

Miniaturized lightweight inductive components and associated networks have been developed for use in wideband transistorized i-f amplifiers which will provide highly stable characteristics over the temperature range of -65°C to +200°C. The silicon transistors utilized limit the upper temperature range to 130°C. All other components will perform to 200°C. An investigation of the effects of the wide temperature ranges upon the transistorized circuits has been conducted. A method of compensating the transistor gain-temperature characteristics has been developed and tested. A wide range of agc control has been successfully achieved with minimum effect upon the i-f amplifier characteristics. Transistorized circuits for agc control with pulsed signals have been developed. The mechanical design of each amplifier provides a small, rugged, light-weight package that may be hermetically sealed. The electrical design has provided simple alignment that will accommodate the normal spread in transistor parameters without modification. An experimental 60 mc tunnel diode negative resistance amplifier has been constructed and briefly evaluated. (Author)

PB 155 021 $9.60

General Electric Co., Schenectady, N. Y.
FORTY-EIGHT MEGAWATT CERAMIC HYDROGEN THYRATRON, by J. E. Dillon. Rept. no. 1 (Final) 15 Dec 58-30 June 60, on Contract DA 36-039-sc-78014, continuation of Contract DA 36-039-sc-71230. [1960] 116p. AD-248 047.

DESCRIPTORS: *Thyratrons, Electron tubes, Design, Hydrogen, Tests, Specifications.

Research is concerned with the evaluation of twelve 48 megawatt ceramic hydrogen thyratrons. A total of 15 sample thyratron tubes were constructed, 10 of which were life tested. Six tubes retained from the Phase I development under Contract DA 36-039-sc-71230 were evaluated, and one of these tubes was life tested. Also certain design modifications were instituted to improve tube performance. A proposed military specification has been prepared in conformance with the results obtained. (Author)

AD-259 880 repriced $2.75

General Electric Research Lab., Schenectady, N. Y.
RESEARCH ON THERMIONIC CONVERTERS. Final rept. for Mar 59-Mar 61 on Thermal Energy Conversion Research, Contract AF 19(604)5472. June 61, 144p. 84 refs. AFCRL-430.

DESCRIPTORS: *Thermionic emission, Space charges, Electrons, Generators, Electricity, *Power supplies, Plasma physics, Vacuum systems, Vapors, Electric fields, Magnetic fields, Ceramic materials, Materials, Cesium, Cathodes, Anodes, Single crystals, Scientific research, Gas Ionization, Heat engines, Electric power production, Tests, Tantalum.

Research on characteristics and associated phenomenon of vacuum, vapor, and crossed-field converters is reported as well as the development of a new ceramic for possible use in the construction of vacuum and vapor converters.

PB 150 980

Kennedy, D. S., and Co., Cohasset, Mass.
TECHNICAL REPORT OF ENGINEERING DATA FOR THE 60-FOOT ELEVATION-AZIMUTH ANTENNA, by Levi Monteiro and John Richard. Rept. on Contract AF 30(602)1955. 13 Nov 59, 45p. TP-319; RADC-TR-59-207; AD-229 687.

DESCRIPTORS: Experimental data, Tests, *Azimuth, Determination, *Antennas, Antenna horns, Antenna masts, Towers, Triggered gates, Radio astronomy.

Mechanical and rf engineering test procedures and results are given concerning the 60-foot elevation-azimuth antenna. Tests discussed and tabulated include perpendicularity of elevation and azimuth axes, alignment of reflector axis with horn ring, balance of reflector, alignment of azimuth axis to vertical, backlash at the azimuth axis, static breakaway torque at elevation and azimuth drives, and rf procedures.

PB 154 785 $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
A FAMILY OF HYBRIDS IN LARGE SIZE COAXIAL LINE, by William A. Both. Rept. on Contract AF 19(604)7400. 17 Jan 61, 12p. 2 refs. 46G-0010; AD-251 245.

DESCRIPTORS: *Transmission lines, Coaxial cables, *Coupling circuits, Mathematical analysis, Design.

The coaxial line hybrid whose coupling is accomplished by bringing the center conductor of two lines close together for a portion of a wavelength has been shown to inherently possess broad band characteristics both in coupling and directivity. By a suitable rearrangement

of the internal structure, it has been possible to retain the coupling and directivity advantages and add the advantage of having the output ports side by side. A series of three hybrids were constructed for use in the 400 to 450 mc band in the standard line sizes of 1 5/8, 3 1/8, and 6 1/8 inches. The internal construction of each is illustrated. (Author)

PB 154 737 $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington. FERRITE AND ANTIFERROMAGNETIC MILLIMETER AND SUBMILLIMETER DEVICES, by G. S. Heller, J. B. Thaxter, and J. J. Stickler. Rept. on Contract AF 19(604)7400. 16 Feb 61, 15p. 20 refs. 82G-0025; AD-251 246.

DESCRIPTORS: *Electronic equipment, Materials, *Ferrites, *Antiferromagnetism, *Waveguides, *Transmission lines.

The typical performance of one of several experimental 2-mm Y-type circulators which utilize ordinary ferrite materials is discussed. The feasibility of utilizing antiferromagnetic materials for millimeter and submillimeter devices is shown. The only limiting factor in fabricating Y-type circulators seems to be the difficulty in fabricating small components. Expectations are that Faraday rotation devices will suffer only this same limitation. The high internal fields in antiferromagnetic materials made them suitable for devices in the millimeter and submillimeter regions of the spectrum. A typical experimental resonant isolator, using Cr_2O_3, gave 10 db of reverse loss and 1 db of insertion loss at 140 kmc and 77 K. In the 1-mm region, MnF_2 may be suitable at liquid He temperatures. NiO may be suitable at about 1/4 mm and room temperature.

PB 155 185 $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington. A NON-GAUSSIAN NOISE GENERATOR, by Donald F. Mayer. Rept. on Contract AF 19(604)7400. 28 Feb 61, 28p. 1 ref. 47G-0016; AD-252 497.

DESCRIPTORS: *Noise generators, Signal to noise ratio, Detectors, *Radio signals, *Detection, *Electronic circuits, *Trigger circuits, *Pulse generators, Video amplifiers, Interference, Sources, Noise, *Radar signals.

In considering the problem of detecting signals in noise, the somewhat unrealistic assumption is usually made that the noise has a Gaussian amplitude density function. To provide a means for experimentally measuring the performance of a detector under non-ideal noise conditions, a noise generator has been built which provides noise having a family of non-Gaussian probability density functions. The 3 db noise bandwidth is from 21.7 to 39.7 Mc. The front panel dimensions of the noise generator are 10 1/2 by 19 inches. The depth is 13 inches. It is entirely self contained, including the power supply. (Author)

PB 154 301 $5.60

Lincoln Lab., Mass. Inst. of Tech., Lexington. ON THE DETECTION OF STOCHASTIC SIGNALS IN ADDITIVE NORMAL NOISE: PART II, by David Middleton. Rept. on Contract AF 19(604)7400. 28 Dec 60, 52p. 17 refs. 34G-0008; AD-250 287.

DESCRIPTORS: Signals, *Communications theory, *Detection, *Frequency shift keyers, Signal to noise ratio, Mathematical analysis, Statistical analysis.

Optimum detection of FSK and on-off normal stochastic signals in additive normal noise backgrounds is examined, (AD-112 385). The resulting optimum structure and the associated error probabilities and Bayes' risks of expected performance are determined, the former explicitly for all signal levels and the important cases of rational noise and signal spectra; the latter explicitly for the critical situation of threshold operation. A method is outlined for obtaining the error probabilities for all signal levels, involving integrals with simple poles only, so that the calculus of residues may be directly applied. A specific example of weak-signal operation involving 2 narrow-band FSK noise signals is considered, and in addition to the error probabilities and (normalized) Bayes risks for a variety of operating conditions (i. e., different a priori signal probabilities and thresholds), the degradation of performance because of spectral overlap between signal channels is computed. Also included in the present study is a general treatment of colored-noise backgrounds, as well as specialization to the white-noise cases, and short discussion of on-off vs. FSK operation in the threshold situation. (Author)

PB 154 928 $3.60

Lincoln Lab., Mass. Inst. of Tech., Lexington. SYSTEM APPLICATIONS OF MILLIMETER WAVES, by J. W. Meyer. Rept. on Contract AF 19(604)7400. 17 Feb 61, 36p. 4G-0010; AD-251 663.

DESCRIPTORS: *Radar beacons, *Radar tracking, *Microwaves, Mathematical analysis, *Microwave communication systems, Communication systems, *Parabolic antennas, Extraterrestrial radio waves, Scattering, *Moon, Radar reflections, *Planets, Detection, Antennas, *Radio astronomy.

Contents:
The range equations
Bistatic radar and scatter communications
Radar beacon (Responsive) systems
Power sensitivity of receiving systems
Atmospheric absorption
Limitations in power production
Pointing accuracy
Space communications and beacon systems
A test of millimeter waves in the space role
Radiometric (Passive) measurements
Components, the system building blocks
The radar beam, multipath, and moon geometry

PB 154 979 $8.10

Lincoln Lab., Mass. Inst. of Tech., Lexington. X-BAND RADAR FOR REENTRY PHYSICS PROGRAM, by J. Sobolewski. Rept. on Contract AF 19(604)7400. 7 Dec 60, 82p. 3 refs. 21G-0013; AD-252 043.

DESCRIPTORS: *Radar receivers, *Radar transmitters, X-band, Radar equipment, *Re-entry vehicles, *Radar echo areas, Measurement, Electronic circuits, Magnetrons, Microwave amplifiers, Design, Operation, Maintenance.

One of the requirements imposed by the Reentry Physics Wallops Island Experiment was the need of a high power radar transmitter and a sensitive receiver operating at X-band frequencies. The objectives of the experiment are to measure the radar cross section of a reentry vehicle with its ionized environment and to determine the existence of and, if present, to measure the amplitude of any energy emitted in the X-band region to 200 nautical miles. A magnetron tube developed by Raytheon and used in the Airborne Long Range Input Program of the Laboratory was available which would produce slightly over one megawatt of power at X-band frequencies; also under development was a Maser type radio frequency amplifier which would make the experiment feasible. An AN/APS-20, S-band transmitter, was modified around the magnetron and a Maser was installed. It is expected that this combination plus the antenna which is essentially a 34-ft parabolic reflector will permit radar measurements meeting the above objectives. (Author)

PB 156 265 $4.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
PHOTOVOLTAIC CELLS. PART II. AN ANNOTATED BIBLIOGRAPHY, by Maureen A. Pearcy. Dec 60, 43p. 93 refs. Special Bibliography SB-60-28; AD-251 572.

DESCRIPTORS: *Photoelectric cells, *Photoelectric effect, *Bibliography, Photoelectric effect (Gamma rays), *Solar energy.

The first volume of this bibliography issued in August 1960, presented a general survey of the literature on photovoltaic cells from 1910 to 1960. This supplement is a more inclusive treatment of the literature of 1959 and 1960, and contains reports and articles which have issued since August 1960.
(See also PB 171 850)

PB 156 247 $12.00

Lockheed Aircraft Corp., Sunnyvale, Calif.
ULTRAMICROWAVE GENERATION AND DETECTION, by Alfred A. Beltran. Dec 60, 166p. 270 refs. Special Research Bibliography SRB-60-12; AD-251 507.

DESCRIPTORS: *Microwave equipment, *Microwave amplifiers, Harmonic oscillators, *Radiofrequency generators, *Klystrons, *Magnetrons, *Traveling wave tubes, Crystals, Ferrites, Electron beams, *Plasma oscillations, *Electron tubes, *Crystal detectors, *Antennas, *Radar duplexers, *Radiofrequency filters, *Backwardwave oscillators, *Bibliography, Transistors, Cerenkov radiation, *Capacitors, *Semiconductors, Detectors, *Waveguides, *Electromagnetic waves, *Microwaves, Propagation, Measurement, *Microwave oscillators, *Diodes, *Reflex klystrons.

Concerned primarily with the generation and detection of ultramicrowaves in the region from 30 to 300 kmc, this annotated bibliography includes material on components, circuits, propagation, measurement, and applications. Besides the grouping of entries into five major categories with subdivisions into specific topics, an author-institute and a subject index facilitate location of specific items. A table in the introduction presents the various frequency equivalents of the ultramicrowave range and defines the inclusive bands and wavelengths. (Author)

PB 155 738 $1.60

Microwave Associates, Inc., Burlington, Mass.
INVESTIGATION OF DUPLEXING TECHNIQUES AT HIGH DUTY CYCLE CONDITIONS, by Harold S. Maddix. Quarterly progress rept. no. 7, 1 Apr-30 June 60, on Contract DA 36-039-sc-78233. [1960] 19p. AD-249 931.

DESCRIPTORS: *Radar duplexers, Design, *Semiconductors, *Transmit-receive tubes, *Microwave equipment, Diodes, Miniature electronic equipment, Gas discharges, Ferrites, Electronic switches, X-band.

The arc loss, recovery time, and breakdown power characteristics of a pre-TR designed for high duty cycle duplexers have been investigated. The results show that breakdown power is strongly dependent on duty cycle. One db recovery times of the order of 0.1 mu-s and arc loss values of the order of 15% at peak powers of 10 kw were obtained. Preliminary results on a Y circulator show a marked deterioration in isolation at a 0.25 duty cycle compared to a 0.001 duty cycle. Results on a miniature varactor diode limiter structure show 7.0 db isolation and 1.5 db insertion loss. (Author) (See also PB 149 609)

PB 156 548 $5.60

Moore School of Electrical Engineering, U. of Pennsylvania, Philadelphia.
POWER DENSITY MEASUREMENT TECHNIQUES, by Nabil Farhat, Ernest Jacobs, and Robert A. Leavenworth. Progress rept. no. 1, 1 Oct 60-1 Jan 61, on Contract DA 36-039-sc-85177. 30 Jan 61, 56p. 23 refs. Moore School rept. no. 61-10; AD-253 436.

DESCRIPTORS: *Power meters, Density, *Radiofrequency power, Measurement, Test methods, Hazards, Crystal detectors, Microwave frequency, Electromagnetic fields, Antennas, Polarization, Radio waves, Absorption, Body, Design.

A survey to gather information on commercially available power density meters and a literature search of current technical information on power density measurement in a radiated field were made. The relationship between incident power density and body absorption is discussed in terms of evaluating the biological hazard. Because a difference between the senses of the radiated field polarization and antenna polarization may result in serious measurement error, the problems of antenna polarization are discussed in detail. Certain complications arising in power density measurement near the radiating source are considered. Finally, several of the factors affecting the detector circuit design is a power density meter are discussed, and it is tentatively concluded that a crystal detector is best suited for measurement of peak power. (Author)

PB 155 023 $13.50

Narda Microwave Corp., Mineola, N. Y.
BROADBAND RIDGE WAVEGUIDES AND COMPONENTS, by Adolph Brenner. Final rept. 1 Dec 58-31 July 60, on Contract DA 36-039-sc-78187. 21 Sep 60, 195p. 28 refs. Rept. no. 5049; AD-248 910.

DESCRIPTORS: *Waveguides, Design, Broadband, *Microwave equipment, Dielectrics, Transmission lines, Test equipment

Optimum designs of double and single round cornered ridge waveguides were determined for families of broadband transmission lines. Specifically set were families of 2.4:1 and 3.6:1 operating bandwidth transmission lines covering the electromagnetic spectrum from 0.39 to 40.0 KMC and 0.42 to 40.0 KMC respectively. All double and single ridge waveguides and flanges designed are in agreement with a proposed ridge waveguide standard of the Electronic Industries Association. Cutoff wavelength ratios, impedance, admittance, power handling capacity and attenuation data were calculated and graphed for the round cornered double and single ridge waveguides. Test instruments and systems components made in double ridge waveguides operating over the 4.75 to 11.0 kmc band were successfully completed. Specifications similar to existing requirements in standard rectangular waveguide components were attained. Broadband systems are considered feasible from the components design standpoint. (Author)

PB 157 704 $2.60

Naval Ordnance Lab., White Oak, Md.
APPLICATION OF THE VAN DER POL EQUATION TO OSCILLATOR DESIGN, by L. R. Hirschel. Mar 60, 24p. 3 refs. NAVORD rept. 6771; AD-234 143.

DESCRIPTORS: *Oscillators, Mathematical analysis, Interference, Antenna couplers, Design.

While the results obtained using the van der Pol equation are generally applicable to all vacuum-tube oscillators, there remains the problem of predicting the behavior of particular oscillator types and determining the effects of the various parameters on operability. To this end the van der Pol equation has been applied to the Hartley, Colpitts, and grounded-grid Colpitts (with autotransformer antenna coupling) oscillator types. Formulas are obtained in terms of the pertinent parameters, for equilibrium amplitude, time constant of amplitude build-up, sensitivity to coherent interference, and noise side-bands. The effect of antenna coupling on these quantities is determined. The results obtained are useful with either grid or plate detection systems. (Author)

PB 157 743 $1.60

Naval Ordnance Lab., White Oak, Md.
FREQUENCY COMPENSATION OF ELECTROCHEMICAL TRANSDUCERS BY FEEDBACK TECHNIQUES, by C. Nicholas Pryor, Jr. 14 Aug 59, 17p. 5 refs. NAVORD rept. 6710; AD-226 247.

DESCRIPTORS: *Transducers, *Feedback amplifiers, Amplifiers, Electrical networks, Accelerometers, Preamplifiers, Design, Mathematical analysis, Frequency, Control.

A system is described for extending the usable frequency range of the large class of electromechanical transducers which use forms of the mass-spring system as sensing elements. The compensation system is based on the tendency for a closed-loop feedback system to exhibit the inverse of the frequency characteristic of its feedback elements. Thus, the output signal of a transducer, when passed through a feedback system having the electrical analogue of the transducer as its feedback element, will tend to have its frequency response corrected. Equations relating the compensated and uncompensated frequency characteristics are developed for this simple compensation, and for a modification that allows control of system damping. Design equations are included to determine the values for the feedback components for any given set of transducer parameters. Examples are shown of the performance of this system in compensating for an electrical network simulating the mass-spring response, and in compensating the response of an unbonded strain gage accelerometer to a narrow pulse. (Author)

PB 157 701 $4.60

Naval Ordnance Lab., White Oak, Md.
THE MULTI-TRACE RECORDING OSCILLOSCOPE, AN INSTRUMENT FOR TRANSIENT SIGNAL RECORDING, by C. N. Pryor, Jr. Nov 59, 42p. 4 refs. NAVORD rept. 6690; AD-231 478.

DESCRIPTORS: *Oscilloscopes, Transients, *Recording devices, *Photographic recording systems, *Cathode ray tubes, Design, Operation, Maintenance, Laboratory equipment.

A multi-trace recording oscilloscope (MTRO) was developed for simultaneous recording of three transient signals on 35mm film. A brief description of the instrument and a detailed description of the circuitry are presented. Instructions for maintenance, adjustment, and routine operation are included. (Author)

UNM-TR-EE-52 $5.60

New Mexico U. Engineering Experiment Station, Albuquerque.
STUDIES OF THE USE OF PHASE-LOCKED LOOPS IN ELECTRONIC DISTANCE MEASURING SYSTEMS, by C. F. Chao, C. T. Hu, and A. H. Koschmann. [1961] 59p. SCDC-2350.

OTS SB-471 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
MAGNETIC RECORDING SYSTEMS (SUPPLEMENTS CTR-298). Aug 61, 6p. 48 refs. OTS Selective Bibliography SB-471.

DESCRIPTORS: *Magnetic recording systems, Bibliography.

Lists reports added to the OTS collection during the period Apr 58 to Aug 61. Covers over 48 references on domestic and foreign research on magnetic data and sound recording systems, storage of information on magnetic tapes, preparation of magnetic recording surfaces, noise control and reduction, and reproduction of sounds.

PB 155 032 $9.60

Philco Corp., Lansdale, Pa.
NUCLEAR RADIATION RESISTANT POWER TRANSISTORS, by T. J. Miles and A. Byer. Final rept. 15 May 59-14 July 60, on Contract DA 36-039-sc-78307. [1960] 111p. 5 refs. R109-DF; AD-249 085.

DESCRIPTORS: Radiofrequency power, Design, Specifications, *Transistors, *Radioactivity, Processing, Radiation tolerance, Cadmium, Germanium, High frequency, Electrodes, Electrochemistry.

The Micro Alloy Diffused-Base Transistor (MADT) technology was used to develop the Radiation Resistant Power Transistor SCL-7002/22. The device is a 15 watt, high frequency, germanium, power transistor capable of withstanding irradiation up to 10 to the fourteenth power fast neutrons/cm to the second power. Although the characteristics of the unit degrade slightly at the 10 to the fourteenth power level, it has been shown that the unit is not severely affected until a level of about 5 x 10 to the fourteenth power is reached. Beside this radiation resistant ability, the transistor is capable of unusually high frequency characteristics. For example, it can produce 8.4 watts output at 10 mc, with 10 db gain at 35% efficiency. It is also capable of 400 nsec total switching times (on plus off) at 1 amp, and hFE ranges are 250 at 1/4 amp, 35 at 5 amp, and 20 at 10 amp. Problems arose during the various stages of development. Those considered significant, and their solutions are presented. (Author) (See also PB 149 376)

PB 152 510 $8.10

Polarad Electronics Corp., Long Island City, N. Y.
[ELECTRONIC GEAR FOR MASER, by I. L. Simensky]. Final engineering rept. on Contract DA 36-039-sc-72830. 20 Nov 58, 88p. 2 refs. Job no. 3120-FR; AD-209 290.

DESCRIPTORS: *Electronic equipment, Crystal oscillators, Stability, Molecular beams, Machine translation, Radiofrequency, Microwave amplifiers, Discriminators, Design.

The objective of this program was to develop an Electronic Frequency Translator to provide low-frequency output signals capable of being stabilized by a molecular-beam oscillator.

PB 154 211 $2.60

Polytechnic Research and Development Co., Inc., Brooklyn, N. Y.
LOSSES IN DIELECTRICS, by R. P. Bauman. Rept. on Contract AF 30(602)1899. 1 Dec 59, 30p. 8 refs. Technical note 4.19; RADC-TN-59-381; AD-231 793.

DESCRIPTORS: *Dielectrics, Dielectric properties, Polarization, Theory, Plastics, Polymers, Temperature.

The theory of dielectric polarization and its application to low-loss dielectric substances at room temperature is reviewed. The theory is then extrapolated to low temperatures and the results reinforced by an argument independent of many of the room-temperature approximations. It is concluded that dielectric loss should become immeasurably small in the common polymeric dielectrics at liquid helium temperature. (Author)

PB 156 629 $5.60

Radio Corp. of America, Somerville, N. J.
PRIMARY CELLS UTILIZING ORGANIC COMPOUNDS AS THE ACTIVE COMPONENTS, by E. Uhler, J. B. Eisen and others. Quarterly rept. no. 7, 15 Dec 59-15 Mar 60, on Contract DA 36-039-sc-78048. [1960] 60p. 8 refs. AD-240 590.

DESCRIPTORS: *Primary batteries, *Organic compounds, Electrolytes, Life expectancy, Magnesium compounds, Bromides, Perchlorates, Electrodes, Battery separators, Chromates, Mercury, Thiols, Sulfur compounds, Thiourea, Cysteine, Cystine, Thiazoles, *Benzenes, Nitro radicals

An all-flat cell $Mg/MgBr_2$/m-DNB, BA-317/U battery weighing 18 oz. was designed which gave 12 hours of service. The military specifications are for a battery weighing 26 oz. and 10 hours of service. The shelf life of cells containing the standard formulations with $MgBr_2$ or $Mg(ClO_4)_2$ electrolytes were found to be encouraging. Preliminary delayed-action data indicate cells containing a $Mg(ClO_4)_2$ electrolyte to have a lower delay than cells containing a $MgBr_2$ electrolyte. The organic-sulfur compounds were not found to be as good as inorganic anode materials on the basis of theoretically and experimentally obtained coulombic capacites. The anode potentials of the stronger reducing organic sulfur derivatives range from +0.3 to +0.5 volt. (Author) (See also PB 150 584)

PB 156 899-1 $1.60

Raytheon Co., Waltham, Mass.
DEVELOPMENT OF X-BAND PULSE-TYPE MAGNETRONS QK674-QK675-QK705, by P. Kauff and M. Weiss Quarterly engineering rept. no. 1, 1 Aug-1 Nov 58, on Contract DA 36-039-sc-78150. [1958] 15p. AD-218 167.

DESCRIPTORS: *Magnetrons, X-band, *Electron tubes, *Miniature electronic equipment, *Miniature electron tubes, Design, Specifications.

Research concerns the development of 3 ruggedized miniature X-band pulse magnetrons each capable of generating a peak power of 50 watts. The tubes are mechanically tunable through the following frequency bands: (1) QK705, 8900 to 9100 mc; (2) QK675, 9500 to 9700 mc; and (3) QK674, 9100 to 9300 mc. Development effort resulted in a packaged QK675 tube which passed all electrical tests. Anode parts for the QK674, QK675, and QK705 were ordered. (Author)

PB 156 899-2 $1.60

Raytheon Co., Waltham, Mass.
DEVELOPMENT OF X-BAND PULSE-TYPE MAGNETRONS QK674-QK675-QK705, by P. Kauff and R. Giuliano. Quarterly engineering rept. no. 1 (Appendix) 1 Aug-1 Nov 58, on Contract DA 36-039-sc-78150. [1958] 16p.

DESCRIPTORS: *Magnetrons, X-band, *Electron tubes, *Miniature electronic equipment, *Miniature electron tubes, Design, Specifications.

See PB 156 899-1

PB 156 900 $5.60

Raytheon Co., Waltham, Mass.
DEVELOPMENT OF X-BAND PULSE-TYPE MAGNETRONS QK674-QK675-QK705, by S. Besse and R. Giuliano. Quarterly rept. no. 3, 1 May-1 Aug 59, and Final engineering rept. 1 Aug 58-1 Aug 59, on Contract DA 36-039-sc-78150. (1959] 57p. AD-235-663.

DESCRIPTORS: *Mangetrons, X-band, *Electron tubes, *Miniature electronic equipment, *Miniature electron tubes, Design, Specifications.

The three tubes are electrically and mechanically interchangeable with the QK698, another X-band ruggedized magnetron previously developed by Raytheon. The new tubes were constructed as frequency extensions of the QK698, and only the anode was modified. Development of the QK674, QK675, and QK705 magnetrons has been successfully achieved. No major development problems were encountered during the course of the program. Twenty QK674, five QK675, and five QK705 tubes were made available for shipment. (Author) See also PB 156 899-2

PB 158 023 $4.60

Rochester U., N. Y.
A METHOD OF OBTAINING ARBITRARY PHASES OF AN M-SEQUENCE, by Robert C. Curry. Rept. on Contract Nonr-668(17). 1 Nov 60, 50p. 28 refs. AD-248 455.

DESCRIPTORS: Binomials, Coding, Sequences, Correlation techniques, Sequence switches, Switching circuits, Synthesis, *Electronic circuits, Phase measurement.

If an m-sequence is generated by an N-stage shift register which has been modified by the addition of logical feedback, a sequence delayed by up to a maximum of ((2 to the power N)-1) digits can be obtained by adding modulo 2 the outputs of various stages of the shift-register generator. A method is given for determining from which stages the outputs should be added to obtain any specified delay. A method is also described for obtaining successive delays automatically, utilizing either a second shift register or punched cards as the programming source. A system was built using a fifteen-stage shift-register generator; a coincidence circuit is used to determine, as a reference, that point in the generation of the sequence at which there is a ONE in all fifteen stages of the shift register. Also described is the network of modulo 2 adders which are used to obtain the delayed sequence. A program is given in the appendix for generating the phase-table with a digital computer (IBM 650). (Author)

SCR-409 $1.00

Sandia Corp., Albuquerque, N. Mex.
OUTPUT MEAN AND DEVIATION VERSUS INPUT S/N FOR LINEAR, QUADRATIC, AND QUANTIZING ENVELOPE DETECTORS WITH SATURATION, by Charles S. Williams, Jr. May 61, 38p.

SCTM-125-61(72) $1.10

Sandia Corp., Albuquerque, N. Mex.
PROPOSAL FOR A RUGGEDIZED MODULE SYSTEM, by Joseph B. Rivard. Apr 61, 11p.

AD-259 547 repriced $1.25

Stanford Research Inst., Menlo Park, Calif.
APPLICATION OF ELECTRON-BEAM MACHINING TECHNIQUES TO SEMICONDUCTORS, by K. R. Shoulders and D. W. Peters. Final rept. on Contract AF 19(604)6114. Apr 61, 41p. 22 refs. SRI Proj. no. 3049; AFCRL-329.

DESCRIPTORS: *Semiconductors, *Machining, *Electron beams, Silicon, Films, Electron lenses, *Electron optics, Electron guns, Electron microscopes, Manufacturing methods, Crystals, Vacuum systems, Molecular beams, Photoengraving, Subminiature electronic equipment, *Thin films, Tests

A silicon film 200 Angstrom units thick has been machined by an electron-beam-activated machining process to a resolution of 1000 Angstrom units by using commercial electron-optical and high-vacuum apparatus. This process uses an electron beam to produce a chemically resistant layer of silica on the surface of silicon. The unprotected silicon is removed by a molecular beam-etching process in a high-vacuum chamber, thus forming a pattern of silicon that conforms to the shape of the electron beam. A design has been completed for a scanning electron microscope which should give a resolution of greater than 200 Angstrom units. The electrostatic lens system is being constructed of metallized ceramic, so that high mechanical stability can be obtained through repeated ultrahigh-vacuum bake-out cycles. Electron gun parts and lens elements have been constructed and tested in operation, and found to agree with the design values, although the entire lens system has not been tested as a unit. Upon successful completion of the electron-optical system and accessory equipment, it is expected that this method of micromachining of semiconductors can be applied to the fabrication of useful microelectronic semiconductor devices.

PB 157 104 $11.50

Stoddart Aircraft Radio Co., Inc., Hollywood, Calif.
IMPROVED LINE IMPEDANCE STABILIZATION METHOD, by J. W. Shaw and E. R. Byerley. Final rept. 1 Jan-1 Oct 60, on Contract NBy-3189. Oct 60, 158p.

DESCRIPTORS: *Coaxial cables, *Transmission lines, *Impedance, *Interference, Radiofrequency, Measurement, Tests.

The purpose of this contract is to develop improved or new techniques of measuring RF conducted interference at frequencies ranging from 14 kilocycles to 100 megacycles. Some of the improved techniques were as follows: (a) Application of the two-current-probe method for measuring impedance and current of actual impedance sources; and (b) Application of the use of half of a current probe for measuring surface currents. Part I contains the general and detailed factual data resulting from these tests. Also included are studies and comments upon the various aspects of line impedance stabilization network methods both from present and future possibilities. Part II contains recommendations for improvement in existing line impedance stabilization network methods based upon the experience gained in performance of the test. (Author)

PB 150 977 $6.60

Vitro Labs., West Orange, N. J.
JAMMING EFFECTIVENESS INSTRUMENTATION STUDY. Final engineering rept. (phase 1) 24 June 57-31 Aug 59, on Contract AF 30(602)1739. 4 Sep 59, 67p. KLX-10166; RADC-TR-59-165; AD-227 849.

DESCRIPTORS: *Radar jamming, *Radar equipment, Effectiveness, Countermeasures, Radar tracking, Search radar, Antiaircraft defense systems, Airborne Test facilities, Instrumentation, Vulnerability.

Final efforts are reported on the development of a philosophy and preliminary design parameters for the automatic and continuous evaluation of electromagnetic jamming effectiveness. Technical descriptions are given of the jamming effectiveness meter and S/N meter. Research efforts were fulfilled through the design and development of the AN/GLQ-7(XW-1) jamming effectiveness evaluator. Pickoff units were installed in the AN/TPS-1D radar to permit automatic extraction of data for processing by the AN/GLQ-7(XW-1) to provide automatic and continuous evaluation of electromagnetic jamming effectiveness.

PB 150 979 $3.60

Westinghouse Electric Corp., Baltimore, Md.
EVALUATION OF AN FM COMMUNICATIONS LINK AT 960 MC USING TROPOSPHERIC SCATTER, by E. L. Smith, W. L. Smoot and others. Final rept. on Contract AF 30(602)1256. [1959] 32p. RADC-TR-59-194; AD-229 277.

DESCRIPTORS: Atmosphere, Scattering, *Frequency modulation, Ultra high frequency, *Radio communication systems, *Microwave equipment, Propagation, Speech, Teletype systems.

An evaluation was made of FM communications over a tropospheric scatter link operating at 960 mc between Verona, New York and Liberty Dam, Baltimore, Maryland. FM communication equipment AN/TRC-43(XW-1) was used. Equipment for one way communication was installed, and a test program outlined, with the objective of obtaining data for system evaluation. Calculations were made for path loss and antenna setting. Three types of data were anticipated: propagation, speech and teletype, with only the propagation data being considered valid. The speech and teletype data were considered invalid because of the low received median level.

PB 171 983 $2.25

Westinghouse Electric Corp., Pittsburgh, Pa.
CORONA RETARDENT FOR CAPACITORS, by T. W. Dakin, L. Mandelcorn, and G. W. Hewitt. Annual rept. 1 May 59-1 June 60, on Thermionic and Solid State Electronic Technology, Contract AF 33(616)6459. June 60, 90p. 15 refs. WADD Technical rept. 60-572; AD-249 775.

DESCRIPTORS: *Capacitors, *Electrical corona, Electric discharges, Temperature, *Radiation damage, Voltage, Design.

This report reviews an investigation of the factors which affect corona threshold voltages in a capacitor consisting of a solid dielectric film operating in a gas at high temperatures (500 degrees C) and under ionizing radiation conditions. It describes ways of raising the corona threshold voltage. As a result of the investigation an optimum capacitor design to avoid corona and radiation effects is recommended. (Author)

Ordnance, Missiles, and Satellite Vehicles

PB 157 610 $4.60

Allied Research Associates, Inc., Boston, Mass.
LAUNCHING OF AIRBORNE MISSILES UNDERWATER. PART VIII. OPTIMUM LAUNCHER VELOCITY AND HEADING IN CONFUSED SEAS, by Irving Frank. Rept. no. 8 on Contract Nonr-2343(00). 31 Oct 60, 50p. 5 refs. Document no. ARA-870; AD-245 653.

DESCRIPTORS: *Guided missiles, Underwater to air, Launching, Oceans, Guided missile trajectories, Velocity, Ocean currents; *Hydrodynamics, Mathematical analysis, Probability.

The trajectory responses (e.g., angle of attack, pitch angle, etc.) of a missile launched underwater in a confused sea can only be determined probabilistically. If a successful launch is defined to be one for which the missile response falls within a defined region, then the probability of success may be optimized by varying the velocity and heading of the launcher. Optimum launcher velocities and headings are found for a missile launched underwater in a confused sea with ocean currents, where the region of success is a square or a circle, for both one- and two-dimensional probability density functions. The effect of launcher heading on the probability of successful launch is illustrated in several graphs, and it is shown that great improvement in the probability of successful launch may be accomplished by the optimization procedures presented. (Author)

PB 158 302 $19.75

American Machine and Foundry Co., Alexandria, Va.
CRITERIA FOR ENVIRONMENTAL ANALYSIS OF WEAPON SYSTEMS, by Charles J. Eiwen and David E. Winer. Rept. on Contract AF 33(616)6550. Aug 60, 311p. 28 refs. WADD Technical rept. 60-627; AD-253 149.

DESCRIPTORS: *Space environmental conditions, *Spaceships, Design, *Space weapons, *Guided missiles, *Satellite vehicles, Extraterrestrial geography, Atmosphere, Gases, Gravity, Radiation effects, *Aircraft.

Results are presented of a study of data on the environmental conditions which an aerospace vehicle might be expected to encounter. A compilation of pertinent information is presented covering atmospheric properties, gravity and magnetic fields, space radiation, extraterrestrial gases and solids, planetary environments, and those environments induced or developed during the ground and flight operation of the vehicle. Extensive references are provided to sources of additional information. Also included are examples of the results of tests and requirements for induced environmental factors specified for various existing vehicles. (Author)

PB 155 192 $4.60

Ammunition Group, Picatinny Arsenal, Dover, N. J.
IMPROVEMENT OF 4.2-INCH MORTAR PROPEL LANT-IGNITION SYSTEM, by R. F. Pohl and W. Graham. Dec 60, 41p. 3 refs. Technical rept. DB-TR: 7-60; AD-251 517.

DESCRIPTORS: *Mortars, *Propellants, Ignition, Ammunition, *Propelling charges, Cartridges, Temperature, Ignition systems, Pressure, Powders, Cartridge cases, Nitrocellulose, Nitroglycerin, Guns.

The standard ammunition for the 4.2-inch mortar develops excessive tube pressure when fired at low temperatures. Screening studies to discover approaches to overcome this problem included (1) modification of propellant charge to improve its physical characteristics, (2) alteration of the ignition cartridge containers to soften the effect of impingement of ignition gases on the propellant, and (3) the use of a modified ignition system also to reduce the severity of ignition. Direct substitution of black powder for M9 flake propellant in the ignition cartridge appears to be the most promising technique for improving the ballistic performance of the 4.2-inch mortar at low temperature. (Author)

PB 154 980 $3.60

Ammunition Group, Picatinny Arsenal, Dover, N. J.
PROCESS ENGINEERING STUDIES RELATING TO THE MANUFACTURE OF PELLETIZED IGNITER COMPOSITION FOR COMPOSITE ROCKET PROPELLANT, by Edward Jescerzewski. Feb 60, 32p. 2 refs. Technical rept. DB-TR: 2-60; AD-251 917.

DESCRIPTORS: *Igniters, Solid rocket propellants, *Pellets, Manufacturing methods, Boron, Potassium compounds, Nitrates, Binders, Production, *Rocket igniters, Ignition, Processing.

Many compositions, including black powder, were pelleted in development of a reliable igniter. A composition consisting of 25% boron and 75% potassium nitrate gave the best results of those compositions tested. Pellets were manufactured experimentally on a hand press. Satisfactory pellets could not be made from the composition without the use of a binder. The best pellet resulted with shellac used as a binder. A similar composition in pellet form became commercially available. This commercial composition was used for high temperature expelling charges, electric squib beads and booster charges before its satisfactory use as a rocket propellant igniter. The composition consists of 23.7% 70.7% potassium nitrate and 5.6% polyester resins binder (Laminac), and is available in 1/8, 1/4, and 1/2 inch diameter pellets. As a replacement for black powder, this composition has some distinct advantages, i.e., higher auto-ignition temperature, lower hygroscopicity and higher heat of reaction. (Author)

PB 158 135 $13.00

Army Ballistic Missile Agency, Redstone Arsenal, Ala.
ARTIFICIAL EARTH SATELLITES OF 1959, by Walter H. Stafford. 26 May 60, 185p. 108 refs. DSP-TM-6-60.

DESCRIPTORS: *Satellite vehicles, Satellite vehicle research, Launching, Instrumentation, Orbital flight paths.

This report is the second in a series on Artificial Earth Satellites. It is intended to be a convenient reference for data on satellites launched during 1959. New data gained from satellites that were launched in previous years are also presented. The data are presented in the form of text, sketches, graphs, tables, and photographs. Descriptions of the launching conditions and scientific experiments are included, as well as the results of orbital measurements. (Author)

PB 158 133 $12.00

Army Ballistic Missile Agency, Redstone Arsenal, Ala.
A LUNAR EXPLORATION PROGRAM BASED UPON SATURN-BOOSTED SYSTEMS. Chaps. III, IV, VI. 1 Feb 60, 163p. 33 refs. Rept. no. DV-TR-2-60.

DESCRIPTORS: *Moon, Exploration, *Satellite vehicles, *Power supplies.

Chap. 3. Payload packages for lunar landings and circumlunar flights
Chap. 4. Lunar exploration
Chap. 6. Power supplies

PB 155 178 $6.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
THE ELASTIC AND PLASTIC RESPONSE OF CANTILEVERS TO AIR BLAST LOADING, by W. E. Baker, W. O Ewing, Jr. and others. Dec 60, 67p. 17 refs. Rept. no. 1121; AD-252 542.

DESCRIPTORS: Beams, *Cantilever beams, Elasticity, Plasticity, Load distribution, Air blast, Explosions, Mechanical properties, Explosives, Shock tubes, Measurement, Blast, Shock wave, Pressure, Mathematical analysis

Data are presented on the elastic and plastic response of two slender cantilevers to air blast from explosive charges ranging from 1/8 lb Pentolite to 10,000 lb. TNT These data are supplemented by the results of a short series of measurements of elastic response of a stiff cantilever to shocktube loading. The nature of the blast loading of these beams is inferred from previous experiments and from numerical computations of blast wave parameters. The elastic response of the beams is then predicted from linear elastic beam theory, and compared with measured response. From the comparison, the authors conclude that the time history of dynamic pressure, inferred from numerical computations is probably in error and that accurate measurements of this blast wave parameter should be emphasized during subsequent blast experiments. (Author)

PB 158 301 $4.60

Dayton U. Research Inst., Ohio.
A TRACKING AND WATER RECOVERY SYSTEM USED IN HIGH ALTITUDE MISSILE TESTS, by Dale H. Whitford. Rept. on Contract AF 33(616)5427. June 59, 45p. 1 ref. WADC Technical rept. 59-287; AD-216 305.

DESCRIPTORS: *High altitude, Instrumentation, *Radar tracking, *Radar equipment, Design, *Sounding rockets Recovery, *Floating bodies, Tropical cyclones, Hurricane tracking

On each of 2 tests, one jettisonable, instrument container (called a pod) was mounted on a missile, ejected from the missile a few seconds prior to missile burnout, and subjected to a high altitude test environment. The 2 tests took place at night at altitudes of 250,000 ft and 125,000 ft. The objectives of the project described were: (1) to determine, by radar tracking, the position of the pod in space at the beginning of the test; and (2) to recover the floating pod in the open sea. Navy ships and aircraft were efficiently coordinated in an air-sea search for each pod after it landed in the water. The first test, called test A, was completely successful. The pod was tracked from launch to test time, and the pod was recovered. A flashing light mounted in the pod was the principle aid to recovery. The second test, called B, was unsuccessful. No tracking data were obtained, and the pod was not recovered, despite a 16 hr coordinated air-sea search. The pod probably has sunk. Tracking and recovery equipment and procedures used for this work were considered to be effective. (Author)

PB 158 143 $2.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
DESIGN OF ENVIRONMENTAL EXPERIMENTS AND RELIABILITY PREDICTION, by A. Bulfinch. Jan 60, 29p. 9 refs. Rept. no. ORDBB-TK-1006.

DESCRIPTORS: *Missiles, *Reliability, Mathematical prediction, Probability, *Combinatorial analysis.

Describes the need for, and use of factorial designs in surveying the separate effects of a large number of environmental treatments with maximum reliability and a minimum number of test specimens. Shows how information from the factorial experiment can be used to define reliability, and how this information can be used in tests of increased severity to predict "reliability-in-use"

PB 154 256 $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
RADAR AND OPTICAL OBSERVATIONS ON REENTRY OF THE TRAILBLAZER I (D-58) TEST VEHICLE OF JUNE 4, 1959, by Harold L. Kasnitz. Rept. on Contract AF 19 (604) 4559. May 60, 18p. 312G-0001; AD-249 718

DESCRIPTORS: *Re-entry vehicles, *Atmosphere entry, *Rocket trajectories, Photographic analysis, Radar tracking, Optical tracking, Spheres, Rocket motors.

The firing was successful with all six stages performing according to design. The X-7 trajectory is at an azimuth of 136.5+ or −1 deg from the launch. The sixth stage reentered almost vertically above map coordinates, latitude 36.625 deg, longitude 74.035 deg at a surface range of 101+ or −1 n. mi. from Wallops and 87+ or − 2 n. mi. from Coquina Beach. The top and bottom of the visible trace correspond to heights of 217,500 ft + or − 4,000 ft and 163,200 ft + or − 4,000 ft respectively. The measured velocity is 22,500 ft/sec to within 3%. A photometric analysis of a chopped-trailed photograph of the sixth stage reentry is presented. (Author)

PB 157 733 $7.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
MISSILE STRUCTURAL LOADS BY NONSTATIONARY STATISTICAL METHODS, by R. E. Bieber. Technical rept. on Contract AF 04(647)97. 29 Apr 59, 75p. 15 refs. LMSD-49703; AFBMD Document no. 61-04-5272; AFBMD 61-832-9; AD-225 595.

DESCRIPTORS: *Guided missiles, Surface to surface, Load distribution, Meteorology, Structures, Statistical analysis, *Guided missile research

Nonstationary statistical methods are applied in obtaining the structural load response of a vertical rising ballistic missile to a flight environment of atmospheric disturbances. The missile configuration is of the IRBM class. A method which involves taking the square root of the input convariance matrix results in the use of existing computer programs. The average, standard deviation, and extreme values of the structural bending moments were calculated at various flight altitudes. The 99-% extreme values are compared with design loads obtained by other criteria. The structural reliability problem is formulated for an ultimate load criterion. A review of nonstationary statistical methods is also given. (Author)

PB 155 442 $4.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
ON THE SOLUTION OF STATISTICAL PROBLEMS IN TRAJECTORY ANALYSIS, by O. R. Burggraf. Technical rept. 3 Oct 60, 48p. 4 refs. LMSD-704026; AD-248 064.

DESCRIPTORS: *Satellite vehicle trajectories, *Statistical analysis, Statistical processes, Differential equations, Numerical methods and procedures, Statistical distributions.

An approximate method is presented for obtaining solutions of certain problems involving random trajectories. The ensemble of trajectories is represented by a time varying probability density function in phase space, whose properties are defined by its moments. A method is derived for determining the moments as the solution of a set of first order differential equations. This method of moments is illustrated by application to two specific problem areas: interplanetary flight with midcourse guidance, and atmospheric entry with aerodynamic control forces. A brief comparison of the method of moments with other methods used in statistical problems is included. (Author)

PB 158 292 $10.10

Lockheed Aircraft Corp., Marietta, Ga.
SHIELDING PROBLEMS IN MANNED SPACE VEHICLES, by R. L. Allen, A. J. Dessler and others. Semiannual technical summary rept. no. 1, 31 Dec 59-30 June 60, on Contract DA 01-009-506-ORD-832. July July 60, 124p. 76 refs. NR-104.

DESCRIPTORS: *Satellite vehicles, *Van Allen radiation belt, *Bremsstrahlung, Protons, Electrons, *Shielding, Attenuation, Dose rate, Penetration.

This report presents results obtained in the first phase of a study of the shielding requirements for manned space vehicles, as imposed by the natural radiations to be encountered in space flight and the radiations from auxiliary nuclear power sources. The penetrating radiations in space are discussed and the reliability of various data is considered. Intensity, energy spectra, and spatial and time dependence of the various types of radiation are summarized in graphical and tabular form. The spatial distribution of trapped protons and electrons are presented in the form of contours of constant flux. The significance and general shielding implications of the more important penetrating radiations are treated. Computational methods for predicting dose rates due to trapped protons and electrons are formulated and results of calculations are presented. Proton dose rate calculations are based on the energy spectrum as determined by Freden and White; bremsstrahlung dose rates are calculated on the basis of the low-altitude electron spectrum measurements of Walt et al and of Holly and Johnson. (Author)

PB 156 063 $8.10

Massachusetts Inst. of Tech., Cambridge.
ORDNANCE LOGISTIC STUDIES III. OPERATIONAL ANALYSIS OF MULTI-ITEM, MULTI-ECHELON SPARE PART SUPPLY SYSTEMS, by Djoerd Hoekstra. Master's thesis. Interim technical rept. no. 17 on Fundamental Investigations in Methods of Operations Research, Contract DA 19-020-ORD-2684. 9 Jan 61, 82p. 32 refs. OOR rept. no. 968:32; AD-252 058.

DESCRIPTORS: *Operations research, Supplies, *Logistics, Scheduling.

Problems are investigated involving the allocation of funds over the many different items and levels of stockage points in a multi-item, multi-echelon spare part supply system. Special reference is made to the operation of military supply systems, where the promptness with which proposed shipments can be realized, or level of service rendered to customers of the system, is an important factor, independently contributing to the performance of the system. Considerable attention is given to what should be considered as optimal performance of a supply system under these circumstances. For a given system structure and given decision functions, conditions are derived which enable us to compute optimal values of ordering parameters used in the system. Underlying these conditions is the assumption that the amount of service provided by a particular group of stockage points depends upon the amount of inventories carried by those stockage points, and upon the service which they receive from the stockage points by which they are supplied. How such relationships can be derived is illustrated. (Author)

PB 157 703 $1.60

Naval Ordnance Lab., White Oak, Md.
CONTACT PHOTOGRAPHY OF IMPACT EXPLOSIONS, by Joseph Wenograd. Mar 60, 15p. 4 refs. NAVORD rept. 6767; AD-234 134.

DESCRIPTORS: *Explosions, Propagation, Sensitivity, *Photographic analysis, *Explosives, Detonation, Combustion, *TNT, *PETN, *RDX, *Tetryl, Lead compounds, Azides, Tests.

The extent and geometry of the propagation of explosions under the conditions of impact have been studied by exposing a photographic film to the light from an impact explosions. Impact explosions have been found to propagate by at least three mechanisms: fast burning, slow burning and detonation. By means of experiments with artificial centers of initiation, it has been shown that the extent of propagation of an impact explosion is essentially independent of the drop height. (Author)

AD-258 754 repriced $0.75

Naval Ordnance Lab., White Oak, Md.
SOUND VELOCITY AND ELASTIC MODULI MEASUREMENTS ON SEVERAL TNT-BASE EXPLOSIVE COMPOSITIONS, by L. Aronica. 10 Feb 61, 23p. 10 refs. NAVORD rept. 6087.

DESCRIPTORS: *Explosives, *TNT, Sound, Sound transmission, Explosions, Measurement, Velocity, Test methods, Elasticity, RDX, Stresses, Vibrations, Cylindrical bodies, Pentolite, Acoustics.

The velocity of longitudinal and transverse acoustical disturbances were measured for a number of cast explosive compositions in bar form by the disturbance resonance technique. Young's modulus, E, and the shear modulus, G, for the explosives have been derived from these measurements. The range in observations for these sound velocity measurements was on the order of 2 to 3%. The sound velocities are estimated reproducible to 1 to 2% the computed moduli are therefore reproducible to 2 to 4%. It is observed, however, that results of this type are highly dependent upon the state and conditions of preparation of the particular charges used in the measurements. Corrections to apply to the results are discussed. The results for TNT are compared to those of other investigators. (Author)

PB 157 695 $2.60

Naval Ordnance Lab., White Oak, Md.
TRANSITION FROM SLOW BURNING TO DETONATION: FLAME FRONTS AND COMPRESSION WAVES DURING GROWTH OF DETONATION, by Royce W. Gipson and Andrej Macek. Mar 60, 23p. 11 refs. NAVORD rept. 6759; AD-234 290.

DESCRIPTORS: *Explosives, *Propellants, *Detonation, Detonation waves, *Tetryl, *Pentolite, Combustion, Velocity, Shock waves, Flame propagation.

A group of experiments is described which elucidates details of propagation of flame fronts, pressure fronts and shock fronts during buildup of steady state detonation. The experimental evidence gives further support to the previously proposed theory that the transition proceeds essentially through two steps, shock formation and shock initiation of detonation. The measurements demonstrate the existence of a flame front which propagates at a fraction of the detonation velocity (1-2 mm/μsec) for as much as 60 μsec and then goes over into steady state detonation within a few microseconds. A proposed explanation of the transition phenomenon is given and discussed. (Author)

PB 158 328 $5.60

Naval Ordnance Test Station, China Lake, Calif.
STRAND-BURNING TECHNIQUES FOR EVALUATION OF PROPELLANTS, by C. H. Carlton. 6 May 55, 55p. 5 refs. NOTS 1090; NAVORD rept. 3478.

DESCRIPTORS: *Propellants, Combustion, Test methods, Test equipment

An improved strand-burning-rate technique and apparatus are described in detail. This apparatus is used to develop new propellants and to test production lots of sheet propellant. The data are successfully employed to predict rocket motor performance, thus effecting tremendous savings over the use of static firing for the early phases of propellant development. The critical problem of strand-inhibitor development is discussed in detail, and an analysis of such variables as drying time, temperature, and conditioning time is included. Sets of standard tests were run to check the equipment each day during the first 2 years of operation, and special tests were made to check equipment changes. A detailed evaluation of the data is given and probable reasons for variance of the data are presented. A preliminary investigation of possible equivalent materials for inhibitors shows that some can be specified for certain propellants. (Author)

PB 157 716 $2.60

Naval Ordnance Test Station, China Lake, Calif.
THRUST-VECTORING EXPERIMENTS WITH GAS INJECTION, by Lester T. Bankston and Harold M. Larsen. 28 May 59, 29p. 6 refs. NAVORD rept. 6548; NOTS TP 2247; AD-233 077.

DESCRIPTORS: *Guided missiles, *Guidance, Gases, Injection, Rocket motor nozzles, Supersonic flow, Jets, Deflection, Thrust, Air, Vector analysis.

Experiments were conducted to explore the feasibility of using gas injection into a propulsion nozzle to generate side forces to steer a missile. In one test series, cold air was injected into a supersonic cold-air stream; in another, hot gas was injected into a supersonic hot-gas stream. Both test series show that the thrust vector of a propulsion engine can be deflected several degrees, even when using unoptimized injection methods. (Author)

SCR-264 $1.10

Sandia Corp., Albuquerque, N. Mex.
WATER ENTRY TESTING USING ROCKET SLEDS, by D. W. Bauder and D. L. Krenz. Apr 61, 6p.

PB 156 059 $6.60

Stanford Research Inst., Menlo Park, Calif.
SYNERGISTIC EFFECTS IN COMBINED ENVIRONMENTS TESTING, by J. S. Arnold. Final rept. on Contract DA 04-200-ORD-1032. Nov 60, 61p. 2 refs. AROD rept. 002N:2-E; AD-251 196.

DESCRIPTORS: *Ordnance, Failure (Mechanics), Reliability, Storage, Transportation, Chemical properties, Physical properties, Thermal effects, Pressure, Acceleration, Electromagnetic properties, Elasticity, Age factors, Radiation effects, Ionization, Tests, Climatic factors.

An analysis has been made to permit better prediction of the effect of interaction of two or more environmental factors on the functioning of Army ordnance materiel. The test unit (TU) is taken to include the simplest subassemblies which make up the systems and equipment of ordnance materiel. Simple unit parameters (SUP) are taken to be the various physical states applicable to a given TU. Within a given SUP, the TU will have a design range and an operating point. Simple environment factors (SEF) may act to drive the operating point beyond the limit of the design range causing TU failure. A synergistic effect is one in which two SEF, acting in combination, cause TU failure which would not result from one SEF acting alone. Descriptions of environment factors and test units in cause-and-effect terms permits analysis of combined-environment actions based on the probability of actual combinations and their effects. It permits rejection of terms that are not representative of physical situations. The number of possible environment combinations are limited to a manageable group. When design ranges and operating points are adequately specified, SEF-SUP analysis should permit prediction of TU failure during the design stage. (Author)

Sanitation and Safety Engineering

PB 171 987 $2.00

[Flight] Accessories Lab., Wright Air Development [Div.] Wright-Patterson AFB, Ohio.
FACTORS INVOLVED IN DETERMINING THE EFFICIENCY OF FIRE EXTINGUISHING AGENTS, by Ralph L. Hough. Apr 59, 75p. 6 refs. WADC Technical note 58-281; AD-203 398.

DESCRIPTORS: *Aircraft fires, Simulation, *Fire extinguishers, Tests, Methanes, Bromides, Chlorides.

HW-38759 $1.10

Hanford Atomic Products Operation, Richland, Wash.
ATMOSPHERIC CONTAMINATION ASSOCIATED WITH INERT-GAS-SHIELDED, CONSUMABLE ELECTRODE ARC WELDING, by F. E. Adley and W. E. Gill. July 55, 8p.

HW-70085 $1.10

Hanford Atomic Products Operation, Richland, Wash.
THE USE OF AQUEOUS FOAM TO CONTROL CONTAMINATION DURING UNDERGROUND BURIAL OF FAILED EQUIPMENT, by D. A. Snyder. June 61, 7p.

FOOD, HANDLING, AND PACKAGING EQUIPMENT

Food

PB 155 180 $5.60

Massachusetts Inst. of Tech., Cambridge.
RAPID METHOD FOR DETERMINING MOISTURE IN DEHYDRATED FRUIT AND VEGETABLES, by B. E. Proctor and J. T. R. Nickerson. Rept. no. 6 (Final) 6 June 58-5 June 59, on Rapid Methods for Moisture Determination, Contract DA 19-129-qm-1206. [1959] 58p. 4 refs. File no. V-338; AD-240 570.

DESCRIPTORS: Food, *Dehydrated substances, Dehydration, Determination, Moisture, Preservation, *Vegetables, Onions, *Moisture meters, Test methods, *Fruits.

Dehydrated potato granules, orange crystals, apple slices, and fresh flavor onion flakes were chosen for moisture analysis using the following: (1) the Karl Fischer titrimetric method; (2) the picric acid colorimetric method; (3) the bulk density method; (4) the Hart moisture meter; (5) the nuclear magnetic resonance analyzer; (6) the cobalt chloride colorimetric method; (7) the Forte moisture analyzer; and (8) the Ohaus moisture analyzer. Of these methods, the Forte moisture analyzer was considered both precise and accurate, and the Ohaus moisture analyzer balance was considered promising. The remaining methods were considered unsatisfactory.

PB 156 198 $2.60

Oregon State Coll. Agricultural Experiment Station, Corvallis.
INVESTIGATION OF THE PROCESSING CONDITIONS NECESSARY FOR THE MANUFACTURE OF HIGHLY ACCEPTABLE, STABLE, PRE-COOKED FREEZE-DEHYDRATED HAMS, by H. W. Schultz and A. F. Anglemier. Rept. no. 11 (Final) 1 Apr 57-31 Oct 59, on Contract DA 19-129-qm-846. [1959] 23p. File no. A-323; AD-236 820.

DESCRIPTORS: *Pork, Acceptability, Preservation, Processing, Storage, *Frozen foods, Dehydrated substances, Food, Fatty acids, Stability, Moisture, Desiccants, Oxidases, Temperature, Packaging, Antioxidants.

Artery pumping of hams was found to be more efficient than spray or stitch pumping. Studies on the curing ingredients did not reveal any evidence that the ingredients used in commercial curing were responsible for deterioration of stored freeze-dried ham. A commercial antioxidant added to the curing solution offered some protective action to the ham cured with the solution. A curing temperature of 38°F, was found to be more effective than curing temperatures of 34°, 42° and 50°F. Precooking ham slices for freeze-drying to an internal temperature of 150°F. over a 3 hour period was found to be more desirable than precooking at higher temperatures for shorter periods of time. Freeze-dried samples sealed and stored under vacuum of 27 in. Hg. were rated by the flavor panel as superior to those sealed and stored under inert gas. A combination of high moisture content (in excess of 4%) and high storage temperature (100°F.) produced the most detrimental changes in the stored product. Rehydratability is affected by orientation of muscle fibers, variability within and between ham muscles, method and temperature of rehydration. (Author)

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

PB 158 303 $5.60

Naval Ordnance Lab., White Oak, Md.
MANUAL OF ISOTOPE RADIOGRAPHY, by E. L. Criscuolo, D. Polansky, and C. H. Dyer. Final rept. 23 May 60, 55p. 11 refs. Ship Structure Committee serial no. SSC-121; AD-237 536.

DESCRIPTORS: *Radiography, Radioactive isotopes, Gamma rays, Materials, Steel, *Ship plates, Radiation hazards, *Industrial radiography.

Information and experimental data on the radiography of steel (particularly welds) using isotopes is presented. This information can assist the radiographer in choosing the proper technique for the selection of isotopes and the estimation of exposure time for a given material. The technique described can be applied to the radiographic inspection of welds contained in ship structures. (Author)

PB 171 994 $3.00

Ryan Aeronautical Co., San Diego, Calif.
GROUND EFFECT MACHINE STRUCTURES STUDY. Final rept. on Contract Nonr-3068(00). 10 Nov 60, 179p. 10 refs. Rept. no. G-42-62; AD-247 323.

DESCRIPTORS: *Ground effect, *Vehicles, Transports, Cargo vehicles, Amphibious vehicles, Antisubmarine warfare, Transportation, Design, Structures, Materials, Flying platforms.

The objective of the ground effect machine structure study program was to arrive at general conclusions with regard to the relationships between structural weight and vehicle gross weight for various design parameters. Specific vehicle designs were selected for study. The initial phase of the study was to determine the operating criteria, or mission description. Since the study is to span the full regime of ground effect machine utilization, five separate vehicle categories were selected for investigation. These categories are: (1) amphibious assault vehicle, (2) anti-submarine warfare platform, (3) cargo lighter, (4) ocean going transport, and (5) military reconnaissance car. (Author)

Engines and Propulsion Systems

PB 157 735 $9.60

Convair, Fort Worth, Tex.
SAFETY ANALYSIS PROGRAM REVIEW FOR NUCLEAR-POWERED VEHICLES, by J. C. Couchman and A. H. Chura. Rept. on Contract AF 33(600)38946. 15 Apr 60, 119p. 29 refs. NARF-60-13T; FZK-9-148; AD-235 839.

DESCRIPTORS: *Aircraft nuclear propulsion, *Nuclear power plants, Reactor hazards, *Fission product activity, Atmosphere, Diffusion, *Reactor safety systems, *Radiation damage, *Radiation effects, Radiation tolerance.

The methods applied in determining nuclear engine hazards are analytically reviewed and appraised on the basis of new data obtained from recently completed field and laboratory experiments. Improved predictive techniques are outlined in a revised Safety Analysis Model, and recommendations are presented for theoretical studies and experimentation aimed at extending and further refining reactor hazards evaluation methods. (Author)

APEX-737 $0.50

General Electric Co., Cincinnati, Ohio.
INSULATION ATTACHMENT BY WELDING FOR AN AIRCRAFT NUCLEAR PROPULSION POWER PLANT, by T. D. McLay. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. Aug 61, 23p.

TID-12988 $3.60

Los Alamos Scientific Lab., N. Mex.
RADIATION SAFETY IN THE DEVELOPMENT AND USE OF NUCLEAR ENERGY FOR ROCKET PROPULSION, by Wright H. Langham. June 61, 36p.

ORNL-1154(Del.) $13.00

Oak Ridge National Lab., Tenn.
AIRCRAFT NUCLEAR PROPULSION PROJECT, ed. by W. B. Cottrell. Quarterly progress rept. for period ending 10 Sep 51 on Contract W-7405-eng-26. Jan 52, 235p.

MATERIALS

PB 158 137 $2.60

Frankford Arsenal [Philadelphia, Pa.]
FUNGUS TESTS OF MATERIALS IN THE CANAL ZONE, by L. Teitell. 22 July 46, 23p. Memo rept. MR-325.

DESCRIPTORS: *Materials, Plastics, Leather, Paints, Greases, Fungusproofing, Tests, Panama.

Plastics, cork-synthetic rubber gasket materials, paints, leather, greases, and optical instruments were stored at the Fort Sherman Testing Station, Panama Canal Zone, for periods of four to ten months. The materials were with and without fungicidal treatments. General observations on the mold susceptibility of the materials and efficacy of the fungicidal treatments are reported. (Author)

PB 154 827 $1.60

Material Labs., Puget Sound Naval Shipyard, Bremerton, Wash.
LATEX MASTIC INJECTED AS SEALANT UNDER FLIGHT DECKING 1st TRIAL INSTALLATION, by W. H. Miles and D. S. Peterson. Jan 61, 12p. 4 refs. Development rept. E-379-3; AD-251 669.

DESCRIPTORS: *Flight decks, *Sealing compounds, Seals, Rubber seals, Weather proofing, Deck coverings, Coatings, Effectiveness, Tests

Methods were investigated to stop leaks through flight decks, without plank removal, by use of a sealant injected between wood deck and underlying steel pan. A survey of possible sealing materials including polysulfides, epoxides, epoxytar, latex mastic, and bitumen compounds indicated neoprene latex-microballoon-hydraulic cement mastic of BUSHIPS NOTICE 9140 to be the most suitable from standpoint of sealing ability, weight, cost, and handling characteristics under adverse weather and temperature conditions. In a trial installation on the flight deck of the USS YORKTOWN (CVS-10), all leaks over a 6,000 sq. ft. area were stopped by pneumatic injection of latex mastic through the wood deck. The latex mastic injection system represents a low cost repair for leaks in wood flight decks. Due to the presence of an interfering coating of rust preventive grease between planks and steel pan, continuous bonding to both surfaces is not obtained. Subsequent movement of the deck may open new water channels requiring repetition of the injection in some areas. There is evidence that complete filling of void areas may not be essential due to the ability of the latex portion itself to penetrate cracks and seal leaks. (Author)

PB 154 239 $4.60

Quartermaster Research and Engineering Command, Natick, Mass.
DEVELOPMENT OF FOAMED PLASTICS, by George E. Murray. Progress rept. no. 2, 1 July 57-31 Dec 58. Sep 60, 43p. 7 refs. Technical rept. CP-17; AD-248 300.

DESCRIPTORS: Shelters, Polymers, Density, *Expanded plastics, *Containers, Tests, Physical properties, Castor oil, Urethanes, Airborne, Production, Polymerization, Vinyl radicals.

It was found that vinyl monomers could be copolymerized with the double bond of castor oil by thermal free radicals produced through the high heat of reaction of castor oil/Quadrol with toluene diisocyanate. Of some 20 vinyl monomers tested, two, vinyl toluene and diallyl phthalate, produced foams with the highest energy dissipation and the lowest resilience. Foams could be produced at -18 deg F from polyurethane-vinyl copolymers but were not self-curing. Foams were produced at -40 deg F using ionic catalysts with vinyl monomers. A mathematical analysis of the crushing of foam showed that the energy dissipation of foams should be proportional to the square of the density of the foam. Preliminary tests indicate that moisture does not affect the energy dissipation of polyurethane foams and that the temperature at which a foam is used does have some effect on its energy dissipation characteristics. Data are presented on the effect of catalysts and inhibitors on the heat formation in the production of polyurethane foams and on the effect of various emulsifiers on the density and structure of a standard foam. (Author)

Ceramics and Refractories

ORO-443 $1.10

Carborundum Co., Niagara Falls, N. Y.
SYNTHESIS AND FABRICATION OF REFRACTORY URANIUM COMPOUNDS. Monthly progress rept. no. 2 1-30 Apr 61, on Contract AT(40-1)-2558, Mof. 2. 4p.

ORO-448 $1.60

Carborundum Co., Niagara Falls, N. Y.
SYNTHESIS AND FABRICATION OF REFRACTORY URANIUM COMPOUNDS, by K. M. Taylor and C. H. McMurtry. Quarterly rept. no. 1, 1 Mar-31 May 61, on Contract AT(40-1)-2558. June 61, 17p.

TID-13375 $1.60

Clemson Coll., S. C.
PRELIMINARY LABORATORY INVESTIGATION OF NEW USES FOR DEPLETED URANIUM OXIDE IN THE CERAMIC INDUSTRY, by C. C. Fain and G. C. Robinson. Rept. on Sub-Contract 1484. Apr 61, 13p.

PB 181 026 $2.00

Dayton U. Research Inst., Ohio.
EVALUATION OF STRESSED AND UNSTRESSED MATERIALS IN SIMULATED HIGH ENERGY FUEL EXHAUST PRODUCT ENVIRONMENTS, by Joseph W. Rosenbery. Rept. on Aviation Fuels, Contract AF 33(616)6198. Jan 61, 73p. 8 refs. WADD Technical rept. 60-179.

DESCRIPTORS: *Refractory materials, Corrosion, *Boron compounds, *Oxides, Tensile properties, Stresses, Nickel, Chromium, Molybdenum, Alloys, Fuels, Microstructure, Tests.

The effects of corrosion of selected stressed and unstressed high temperature materials by molten boric oxide are presented. A sequence of eleven experimental exposures was accomplished. The effects of small additions of elemental boron and carbon to the molten bath are described. Results show that stress has no significant effect upon the onset or rate of the corrosion process. This report is the last of a sequence of three describing the experimental evaluation of the corrosion of "superalloy" type materials and selected ceramic coatings by boric oxide at temperatures from 1600°F to 2100°F. (Author)

GA-2379 $3.60

General Atomic, San Diego, Calif.
DISLOCATION RELAXATION SPECTRA IN PLASTICALLY DEFORMED REFRACTORY BCC METALS, by R. H. Chambers and J. Schultz. Rept. on Contract AT(04-3)-167, Proj. 56. 8 Aug 61, 40p.

UCRL-6502-T $4.60

Lawrence Radiation Lab., U. of California, Livermore.
BERYLLIUM OXIDE - ITS PROPERTIES AND APPLICATION IN NUCLEAR REACTORS, by A. J. Rothman. June 61, 41p.

AD-258 574 repriced $1.50

New York U. Coll. of Engineering, N. Y.
REFRACTORY COATINGS FOR TUNGSTEN, by C. G. Goetzel and P. Landler. Rept. for Nov 59-Oct 60 on Refractory Inorganic Non-Metallic Materials, Contract AF 33(616)6868. Mar 61, 51p. 51 refs. WADD Technical rept. 60-825.

DESCRIPTORS: Tungsten, Oxidation inhibitors, *Refractory coatings, Tests, *Tungsten wire, Wire.

A preliminary study of the feasibility of protecting tungsten wires against oxidation at 3300°F (1815°C) was made. A tungsten disilicide coat was the most promising coating for this operating temperature. Several siliconizing methods were tried, including vapor plating and dipping into molten copper-silicon bath, and the simplest cementation selected for closer investigation. The inherent brittleness of tungsten appears further aggravated by the development of microcracks in the layers as well as in the substrate during siliconizing. It was found that pack-siliconized wires can withstand oxidation at 3300°F in still air for prolonged periods up to and exceeding 10 hrs. There is no destruction of the coating in the high temperature zone due to a viscous glassfilm. A pronounced tendency toward self-healing is a useful property. A serious drawback of the disilicide coat, however, is its low temperature oxidation ("disilicide pest") which occurs in parts exposed to temperatures between 1200° and 2280°F (650° -1250°C) for prolonged periods. Preliminary attempts to deposit ZrO_2 on top of siliconized wires by means of plasma arc spray method remained largely unsuccessful. (Author)

PB 171 986 $3.00

Southern Research Inst., Birmingham, Ala.
INVESTIGATION OF FEASIBILITY OF UTILIZING AVAILABLE HEAT-RESISTANT MATERIALS FOR HYPERSONIC LEADING-EDGE APPLICATIONS. VOLUME V. MECHANICAL PROPERTIES OF BARE AND COATED MOLYBDENUM ALLOY, by J. Robert Kattus, James B. Preston, and Herman L. Lessley. Rept. for July 58-July 60 on Ceramic and Cermet Materials, Subcontract to Bell Aircraft Corp. Contract AF 33(616)6034. Nov 60, 161p. 1 ref. WADC Technical rept. 59-744, vol. V.

DESCRIPTORS: *Hypervelocity vehicles, Satellite vehicles, Hypersonics Aircraft, Airframes, High temperature research, Re-entry aerodynamics, Refractory materials, *Heat resistant alloys, *Molybdenum alloys, Titanium alloys, Coatings, Temperature, Mechanical properties, Tensile properties, Creep, Alloys, Materials

The mechanical properties of arc-cast, fully recrystallized molybdenum 1/2% titanium alloy—bare, W-2 coated, and Durak-MG coated were determined at temperatures up to 3000 F. With W-2 and Durak-MG coatings, this alloy is recommended for applications that are limited to no plastic strain at room temperature and to small amounts of plastic strain at room temperature and to small amounts of plastic strain at elevated temperatures to a maximum of 3000 F for times up to 10 hrs. (Author)

PB 158 145 $5.60

Sperry Gyroscope Co., Great Neck, N. Y.
METAL-TO-CERAMIC SEAL TECHNOLOGY STUDY, by S. S. Cole, Jr., H. W. Larisch and others. Technical note no. 4, 31 Mar-30 June 60, on Contract AF 30(602)2047. July 60, 60p. 9 refs. Sperry rept. no. NA-8240-8184-4; RADC-TN-60-192; AD-246 644.

DESCRIPTORS: *Electron tubes, *Seals, *Ceramic materials, Metals, Mechanical properties, Tensile properties, *Metal seals.

Adherence and torque peel tests indicated that the majority of the metallizing mixtures yield optimum strengths when sintered at 1600 C. The compression testing program indicated those mixtures which will produce high ceramic-to-metal seal strengths. An

individual value of 28,400 psi and an average of 3 duplicate specimens of 21,400 psi in tension were obtained. A photoelastic investigation indicated that (1) Sperry's Tensile Design No. 1 is not subject to the shoulder breaks that are common in the ASTM tensile specimens and (2) in the seal area of all three tensile designs considered, a bending moment is present which produces nonlinear stress at the seal, giving low values in tension. It was thought that a more realistic tensile strength value from Tensile Design No. 1 would be given by a factor of 1.33 times the indicated strength.

Fuels, Lubricants, and Hydraulic Fluids

PB 158 321 $8.60

Little, Arthur D., Inc., Cambridge, Mass.
PRESSURIZED TRANSFER OF CRYOGENIC LIQUIDS. Rept. on Contract AF 04(647)130, continuation of Contract AF 04(645)34. 1 June 58, 96p. Special rept. no. 78; Rept. C-59879-9; AFBMD Doc. no. 8-8735; AD-219 437.

DESCRIPTORS: *Liquid rocket propellants, Handling, Storage, *Fuel storage tanks, Propellant tanks, Pressure, Oxygen, Nitrogen, Liquified gases, Gases.

Horizontal, cylindrical tanks of liquid oxygen and liquid nitrogen were pressurized with oxygen and nitrogen gas, and the pressure-temperature-mass history of the high-pressure gas supply and of the tank ullage was measured. In some tests, the liquid was transferred by such pressurization. From the resulting data, simple empirical rules were developed for the estimation of gas requirements. Horizontal tanks containing liquid nitrogen or liquid oxygen can be pressurized with nitrogen or oxygen gas and maintained in this non-equilibrium state for a considerable time without excessive condensation losses. The amount of gas required to pressurize from atmosphere to 100 psig is not sensitive to changes in the pressurization rate (6 to 60 sec), the manifold size or pressure, or the initial temperature of the storage-tank wall. For any given tank, the condensed mass per square foot of liquid surface for the first 60 sec is nearly independent of the ullage volume and the pressurization rate. When a condensable gas is used to overpressure a tank of cryogenic liquid, a gas diffuser or deflector is necessary if turbulence of the liquid and subsequent excessive condensation losses are to be minimized.

LA-2584 $0.50

Los Alamos Scientific Lab., N. Mex.
EVALUATION OF DRAWING LUBRICANTS FOR TANTALUM AND URANIUM, by D. J. Murphy, R. I. Batista and others. Rept. on Contract W-7405-eng-36. Sep 61, 23p.

AD-259 540 repriced $2.00

Ordnance Fuels and Lubricants Research Lab., Southwest Research Inst., San Antonio, Tex.
A VOLATILITY EXPRESSION FOR VAPOR-LOCK CONTROL, by John N. Bowden. Rept. on Contract DA 23-072-ORD-1221. Dec 59, 71p. 15 refs.

DESCRIPTORS: *Gasoline, Vaporization, Military requirements, Vapor pressure, Control, Tests.

A large number of experimental and commercial fuels were tested for vaporforming characteristics with a vapor/liquid ratio apparatus. From these data an indicator was developed and called the TVL index, which expresses the vapor-locking tendencies of a fuel. Vehicle vapor-lock tests served to correlate the laboratory work with the performance of fuels in vehicles and to tentatively establish volatility limits for military gasoline in terms of temperature-vapor/liquid ratio relationships. The TVL index limits would curtail the use of high concentrations of pentane as the pressurizing agent and would allow more use of fuels with relatively high Reid vapor pressures but low vapor-locking tendencies. The proposed limits are consistent with current Reid vapor pressure and ASTM distillation requirements for military gasoline; however, as an alternate recommendation, these could be modified slightly to eliminate fuels with high vapor-locking tendencies and to include those with low vapor-locking tendencies. (Author)

PB 155 736 $4.60

Philips Labs., Irvington-on-Hudson, N. Y.
HEXAGONAL MAGNETIC MATERIALS FOR MICROWAVE APPLICATIONS, by F. K. du Pré, D. J. De Bitetto and others. Final rept. 9 June 58-30 June 59, on Contract DA 36-039-sc-78071, continuation of Contract DA 36-039-sc-73223. [1959] 45p. 4 refs. Technical rept. no. 136; Case no. 13-136; AD-226 449.

DESCRIPTORS: *Microwave equipment, Materials, *Ferrites, *Ceramic materials.

The effect of replacement of Fe^{+3} by Al^{+3} on the microwave properties of permanent magnetic ceramic materials of the type $M^{II}O\text{-}6(Fe_2O_3)$ was investigated. In the series $1.1SRO\cdot Al_2O_3\cdot(6\text{-}x)Fe_2O_3$, an increase in the ferromagnetic resonant frequency with x was extended to a value of x = 1.0, and a composition of x = 1.35 was prepared. A theory explaining the Curie temperature decrease with increasing x is proposed. A moderate decrease of the ferromagnetic resonance line width of $SrO\cdot 6Fe_2O_3$ and $SrO\cdot 0.5Al_2O_3\cdot 5.5Fe_2O_3$ has been achieved. A new M-band microwave measuring device was used to evaluate materials in the series $SrO\cdot xAl_2O_3\cdot(6\text{-}x)Fe_2O_3$ for use in resonance isolators. Ferromagnetic resonance line widths of crystals of $BaO\cdot 6Fe_2O_3$ and $SrO\cdot 0.43Al_2O_3\ 5.57Fe_2O_3$ were measured.

PB 181 028 $1.25

Rock Island Arsenal Lab., Ill.
COMPATIBILITY OF LUBRICATING GREASES, by F. S. Meade. 25 May 61, 46p. 15 refs. Rept. no. 61-2132.

DESCRIPTORS: *Lubricants, *Greases, Physical properties, Tests

The compatibility of binary mixtures of 12 types of greases when mixed in the component ratios 10%-90%, 50%-50%, and 90%-100%, was determined. The greases included conventional soap thickened greases, non-soap

thickened greases, and an organic thickened grease. Compatibility was determined by the extent of hardening or softening exhibited by binary mixtures after a 10,000 stroke worker test as compared to the extent of hardening or softening exhibited by the components when subjected to a similar test. A total of 1261 tests were made of which 75% of the mixtures were compatible. Among the incompatible mixtures, more than seven times as many instances of softening were found than instances of hardening. Most of the incompatible mixtures occurred in the 50%-50% mixture ratio. Sodium soap-mineral greases produced the fewest incompatible mixtures. Hydrophobic silica-mineral oil greases produced the greatest number of incompatible mixtures. It was found that grease compatibility could not be accurately predicted from the mere knowledge of thickener and fluid types. A table was prepared giving the compatibility data obtained in this study. (Author)

AD-260 345 repriced $2.00

Virginia U., Charlottesville.
STUDIES OF ANTIOXIDANT AND INHIBITOR MECHANISMS AT ELEVATED TEMPERATURES, by James W. Cole, Jr. Rept. on Contract AF 18(603)103. 25 Apr 61, 73p. 21 refs. AFOSR-554.

DESCRIPTORS: *Lubricant additives, *Antioxidants, *Oxidation inhibitors, Oxidation, *Corrosion inhibition, Corrosion research, *Phenothiazine derivatives, *Amines, Copper, *Pyridines, Catalysts, Catalysis, Synthesis, Copper compounds, Fatty acid esters, Chemical reactions, High temperature research, Labeled substances, Reaction kinetics, Hydraulic fluids, Lubricants, Additives

A study was made of the behavior of some antioxidants and corrosion inhibitors in di-(2-ethylhexyl) sebacate under oxidizing conditions at 204 C alone and in the presence of metallic Cu and Cu compounds. Considerable attention was given to kinetic-mechanistic studies with phenothiazine and its derivatives, with phenothiazines containing radioactive S-35 and with N-C-14-methyl phenothiazine. Oxidations with some amines and pyridine derivatives, especially the dipyridylamines were also studied. The presence of Cu and certain Cu compounds enhanced the oxidation inhibiting properties of the additives. Metal coordination complexes appear to be a factor in the mechanism. The syntheses and behavior of 27 new compounds are described. (Author)

Leather and Textiles

PB 171 997 $2.25

American Machine and Foundry Co., Niles, Ill.
INSTANTANEOUS LOCAL TEMPERATURES OF AERODYNAMIC DECELERATORS. PART I. METHODS OF PREDICTING, by G. Engholm, R. J. Bas chiere, and R. A. Bambenek. Rept. for July 59-Aug 60 on Fibrous Materials for Decelerators and Structures, Contract AF 33(616)6673. Dec 60, 85p. 40 refs. WADD Technical rept. no. 60-670, pt. 1.

DESCRIPTORS: *Parachutes, *Parachute fabrics, Temperature, Heat transfer, Thermal diffusion, Parachute descents.

A numerical technique is presented for predicting the temperatures developed in aerodynamic decelerators at high speeds. The predictions are obtained both by a simple method to estimate local equilibrium temperatures and by a more complex method to estimate instantaneous, local, temperature profiles. Sample calculations are included. A new numerical technique is described for predicting one dimensional thermal diffusion. This technique permits the use of larger time increments and therefore fewer calculations are necessary than with other numerical techniques. (Author)

PB 181 029 $0.75

Quartermaster Research and Engineering Command, Natick, Mass.
SOVIET-BLOC DEVELOPMENT OF SYNTHETIC FIBERS, by R. C. Laible, L. I. Weiner, and E. Stone. Apr 61, 30p. 44 refs. Textile Series rept. no. 117.

DESCRIPTORS: *Synthetic fibers, USSR, Nylon, Copolymerization, Polymers, Chemical analysis, Textiles

Man-made fiber developments in the Soviet bloc are discussed in relation to Western achievements. At least three of the fibers - Enant, a nylon 7; Ftorlon, a fluorine-containing copolymer; and Vinitron, a combination of nitrocellulose with chlorinated polyvinyl chloride - have no counterparts in the United States or Great Britain. Other fibers, such as Nitron, Lavsan, Anid, Steelon, and Khlorin, are so closely related to Orlon, Dacron, nylon 66, nylon 6, and Pe Ce respectively that the degree of originality in their development cannot be ascertained. East German experimental work on hollow fibers and the conjectural Latvian use of 2-methylpiperazine for the preparation of new polyamides show the possible contribution of the satellite countries to the total Soviet effort. The Russian scientific climate is briefly discussed to show the increasing effort in the field of new synthetic fibers that may be expected from Russia in the future. (Author)

Rubber and Elastomers

PB 158 130-1 $1.10

Florida U., Gainesville.
RESEARCH AND DEVELOPMENT OF FLUOROCARBONAMIDINE ELASTOMER NO. 280 FOR USE AS AN ULTRA HIGH TEMPERATURE DIELECTRIC, by A. D. Delman and I. J. Stanley. 6 Mar 58, 9p. 8 refs. Lab. Project 5990-1, Progress rept. 1.

DESCRIPTORS: *Fluorocarbons, Polymerization, Molecular structure, Chemical peroperties, Physical properties, *Elastomers, Synthesis, *Dielectrics, *Amides, Temperature, Heat resistant polymers.

The chemical and physical properties of a perfluorocarbonamidine elastomer were studied for purposes of characterization and to provide a basis for developing a cure mechanism for converting the crude polymer into elastomeric compounds having good ultra-high temperature dielectric properties. Preliminary analytical and infrared spectrographic data are presented to support postulated structures resulting from the copolymerization of perfluoroglutarodiamidine and

perfluorobutyromonoamidine employed in the synthesis of the elastomer. Similar studies are underway on related high temperature resistant elastomers. On the basis of the reactive groups in the copolymer, curing mechanisms are now being investigated. (Author)

PB 158 130-2 $1.60

Florida U., Gainesville.
RESEARCH AND DEVELOPMENT OF FLUOROCARBONAMIDINE ELASTOMER NO. 289 FOR USE AS AN ULTRA-HIGH TEMPERATURE DIELECTRIC, by A. D. Delman and I. J. Stanley. 28 May 58, 11p. 2 refs. Lab. Project 5990-1, Progress rept. 2.

DESCRIPTORS: *Fluorocarbons, Polymerization, Molecular structure, Chemical properties, Physical properties, *Elastomers, Synthesis, *Dielectrics, *Amides, Temperature, Heat resistant polymers.

The molecular structure and chemical and physical properties of the second in a series of specially prepared fluorocarbonamidine polymers were investigated to provide a basis for developing suitable cure systems for converting the crude polymer into elastomeric compounds having good ultra-high temperature dielectric properties. Results indicate that the material under investigation is a copolymer of perfluorobutyromonoamidine and perfluoroadipodiamidine containing reactive amidine groups. Preliminary results of curing studies, based on considerations of molecular structure show the potential suitability of aryl diamine compounds, such as p-phenylenediamine, for use as cross-linking agents. (Author)

PB 171 981 $1.00

Physics Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio.
EVALUATION OF BUNA-N (NBR) GASKETS IN PROTOTYPE APPLICATIONS UNDER GAMMA FLUX, by John A. Parker and Denver Hale. Rept. for Sep 57-Jan 59 on The Chemistry and Physics of Materials. Feb 61, 37p. 8 refs. WADD Technical rept. 59-661.

DESCRIPTORS: *Rubber gaskets, Tests, *Nitrile rubber, Chemical properties, Physical properties, Radiation tolerance, *Rubber seals, Ferrocenes, Gamma radiation.

Both qualitative and quantitative sealability tests were evaluated to test the theoretical prediction of the stability of certain acrylonitrile-butadiene rubber stocks. Reasonable agreement between sealability coefficients was obtained from the seal tester and relative replacement times over a dose range from 2×10^9 to 2×10^{10} ergs/g carbon (one roentgen = 87.7 ergs). Evaluation criteria for these compositions were established by application of the Bopp-Sisman relationship to observed changes in the elastic modulus, reported in WADC Technical Report 58-78. The effect of ferrocene as a potential "anti-rad" was investigated and found to improve the radiation resistance of these stocks. (Author)

MATHEMATICS

APAE-MEMO-288 $10.50

Alco Products, Inc., Schenectady, N. Y.
DYNAMIC SIMULATION OF MULTI-PASS PRESSURIZED WATER NUCLEAR POWER PLANTS BY ANALOG COMPUTER TECHNIQUES, by J. O. Brondel. June 61, 140p.

BNL-5623 $1.10

Brookhaven National Lab., Upton, N. Y.
RANDOM NOTES ON HPD FRAME IDENTIFICATION PROBLEM, PART I. THE D DIFFERENCE PROBLEM, by R. M. Sugarman. July 61, 6p.

AD-256 679 $1.60

Brown U. Div. of Applied Mathematics, Providence, R. I.
REGRESSION ANALYSIS OF VECTOR-VALUED RANDOM PROCESSES, by W. Freiberger, M. Rosenblatt, and J. Van Ness. Technical rept. no. 11 on Contract DA 36-039-sc-78130. Apr 61, 19p. 6 refs. DA-sc-78130/11.

This report released by the cognizant military agency for sale to the public 26 Sep 61

DESCRIPTORS: *Statistical analysis, Least square method, Probability, Statistical processes, Matrix algebra.

PB 158 078 $6.60

California U., Berkeley.
ANALYTICITY IN CERTAIN BANACH ALGEBRAS, by Errett Bishop. Technical rept. no. 13 on Contract Nonr-222(62). Nov 60, 69p. 9 refs. AD-252 643.

DESCRIPTORS: *Algebras, Algebraic topology.

PB 156 067 $1.60

California U., Los Angeles.
EXTENSION OF THE METHODS OF R. AND F. NEVANLINNA TO MEROMORPHIC FUNCTIONS ON RIEMANN SURFACES, by Leo Sario. Technical rept. no. 25 on Contract DA 04-495-ORD-1959. Mar 61, 13p 5 refs. OOR rept. no. 1517:28; AD-253 778.

DESCRIPTORS: *Complex variables, *Functions, Theory

PB 156 712 $7.60

California U., Los Angeles.
REPRODUCING FORMULAS ON RIEMANN SURFACES, by Burton Rodin. Technical rept. no. 26 on Contract DA 04-495-ORD-1959. Mar 61, 74p. 21 refs. OOR rept. no. 1517:29; AD-254 900.

DESCRIPTORS: Differential equations, Theory, *Complex numbers, Transformations (Mathematics), *Functions, Real variables, Harmonic analysis, Sequences.

Contents:
Preliminaries
Differentials on a Rieman surface
Principal functions
Inner product representations
Reproducing kernels
Relationships between kernels and principal functions
Applications
Rieman-Roch type theorems
Abel's theorem and generalizations
Interpolation problems
Boundary integral representations
The Poisson-Stieltjes representation
The generalized Picard theorem.

PB 156 062 $1.10

Carnegie Inst. of Tech., Pittsburgh, Pa.
THE RECIPROCAL OF A FOURIER SERIES, by R. J. Duffin. Technical rept. no. 50 on Mathematical Analysis of Electrical and Mechanical Systems, Contract DA 36-061-ORD-490. 10 Apr 61, 10p. 1 ref. Rept. no. CIT-ORD-6D-TR50; OOR rept. no. 223:54; AD-254 899.

DESCRIPTORS: *Fourier Analysis, Sequences, Series, Complex variables.

Given the Fourier coefficients of two functions relative to an orthonormal sequence, a procedure is developed for finding the Fourier coefficients of the ratio of the two functions. (Author)

CEND-130 $3.60

Combustion Engineering, Inc., Windsor, Conn.
CRUMB-2: A ONE POINT, FOUR GROUP REACTOR BURNUP CODE FOR THE IBM-7070, by C. J. Hansen. Rept. on Contract AT(30-1)-2379. May 61, 38p.

GA-1803 $2.60

General Atomic, San Diego, Calif.
ROBESPIERRE: A PROGRAM FOR CALCULATING THE NELKIN SCATTERING KERNEL FOR BOUND HYDROGEN, by D. H. Perkel. Rept. on Contract AT(04-3)-167. 1 Aug 61, 26p.

APEX-607 $1.75

General Electric Co., Cincinnati, Ohio.
CONVERSION OF PROGRAM SHAG TO THE IBM 7090, by F. D. Wenstrup. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. Apr 61, 76p.

APEX-658 $0.50

General Electric Co., Cincinnati, Ohio.
JOIN COMPUTER PROGRAM, by John Wallach. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. July 61, 18p.

APEX-601 $1.50

General Electric Co., Cincinnati, Ohio.
PROGRAM ZIP, A GENERALIZED REACTOR (NUCLEAR ANALYSIS) SEQUENCE (IBM 7090), by W. L. Orr. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. July 61, 59p.

APEX-605 $1.00

General Electric Co., Cincinnati, Ohio.
SHIELD REGION DATA CONVERTER PROGRAM 20-7, by J. M. Martin. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. Apr 61, 49p.

GNEC-184 $11.50

General Nuclear Engineering Corp., Dunedin, Fla.
COMPUTER PROGRAM FOR LOSS-OF-COOLANT ACCIDENT STUDIES. ECNG-FWCNG Project. June 61, 152p.

HW-SA-2199 $1.60

Hanford Atomic Products Operation, Richland, Wash.
FURTHER ASPECTS OF A MULTICOMPARTMENT MIGRATION MODEL, by A. D. Wiggins. Rept. on Contract AT(45-1)-1350. June 61, 16p.

PB 155 042 $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
A SEQUENTIAL PROCEDURE FOR SAMPLING THE POPULATION WITH THE MAXIMUM MEAN, by Harold Kushner. Rept. on Contract AF 19(604)7400. 23 Feb 61, 13p. 22G-0055; AD-252 047.

DESCRIPTORS: *Population, Statistical functions, *Sequential analysis, Sampling.

The sequential determination of the maximum of the unknown means of several statistical populations is considered, while simultaneously attempting to maximize the sum of the observations. A rule to determine which of the populations to sample next is put forth and its asymptotic properties are studied. (Author)

PB 154 893 $2.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
INTERVAL INTEGRALS, by R. E. Moore, Wayman Strother, and C. T. Yang. Technical memo. Aug 60, 26p. 2 refs. LMSD-703073; AD-246 886.

DESCRIPTORS: Errors, Analysis, *Integrals, Integration, Real variables, Functions, Digital computers, Operation

An arithmetic for intervals was studied by Moore and Yang (LMSD-285875) as a basis for error analysis in digital computations. In that study, an integral was defined for certain functions whose domain and range are contained in the space of bounded closed intervals of real numbers. Further properties of the integral are established, and this integral is related to integration of ordinary real-valued functions. (Author)

PB 156 244 $2.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
NONLINEAR TWO POINT BOUNDARY PROBLEMS WITH APPLICATIONS TO THE RESTRICTED THREE BODY PROBLEM, by R. E. Moore. Technical document. Dec 60, 30p. 3 refs. LMSD-895025; AD-250 888.

DESCRIPTORS: Functional analysis, *Tensor analysis, Vector analysis, Series, *Numerical analysis, *Differential geometry, Differential equations, Mechanics, Quantum mechanics, *Non-linear differential equations.

An existence and uniqueness theorem is proved for solutions of the two-point boundry problem: x equals f(t, x), x(0) equals p, x(T) equals q, where x and f are finite dimensional real vectors with f continuous and satisfying a Lipschitz condition in x in a certain neighborhood in (t, x) space of the line segment (pq) sub zeros in the initial plane t equals 0. A unique solution exists in this neighborhood for small enough T. A sequence of functions defined by a Picard iteration converges to the solution. An application of the theorem is made to the restricted three-body problem. (Author)

LAMS-2522 $4.60

Los Alamos Scientific Lab., New Mex.
THE POT CODE, by Clarence E. Lee. Rept. on Contract W-7405-eng-36. July 61, 47p.

PB 157 705 $7.60

Naval Ordnance Lab., White Oak, Md.
ON DISCONTINUOUS SOLUTIONS OF QUASI-LINEAR FIRST ORDER PARTIAL DIFFERENTIAL EQUATIONS, by Avron Douglis. 22 Jan 60, 79p. 19 refs. Mathematics Dept. rept. M-9; NAVORD rept. 6775; AD-234 336.

DESCRIPTORS: *Partial differential equations, *Non-linear differential equations, Difference equations, Numerical methods and procedures, Viscosity, *Compressible flow, Mathematical analysis.

Economical ways to calculate the action and interaction of shocks in the solution of non-linear hyperbolic differential equations are tested empirically but have not been completely founded in theory. Theoretical justifications are given of a family of such methods for a simple equation. The methods treated include non-linear viscosity introduced by von Neumann and Richtmyer, a modified method of linear viscosity, and a procedure not based upon viscosity. (Author)

PB 156 082 $3.60

North Carolina U., Chapel Hill.
A MAXIMIZING PROBLEM WITH SEVERAL APPLICATIONS IN STATISTICAL THEORY, by Carl-Erik Sarndal. Interim technical rept. no. 5 on Estimation and Testing of Parameters of Distributions by Order Statistics, Grant DA-ORD-7. 3 Apr 61, 39p. 10 refs. OOR rept. no. 2776:5; AD-254 081.

DESCRIPTORS: *Statistical distributions, Theory, Sampling, *Mathematical production

Three different problems in statistical theory are considered all of which require the maximization of a certain function. The first of these problems concerns the estimation of an unknown location or scale parameter by means of a linear estimate when only k optimally spaced observations out of a large sample of size n are used for the estimate. Two lemmas are proved which enable statements to be made about the form of the optimum spacings as k approaches infinity and about the rate at which the asymptotic efficiency approaches unity with increasing k. For small values of k, an easy method of approximating the laboriously calculated optimum spacings is illustrated. The loss of efficiency due to this approximative procedure is negligible. The second problem regards the optimal determination of k stratification points in proportional sampling. It is shown how the accuracy increases with an increasing number of strata. For a small number of strata, good approximations to the optimum stratification points can easily be determined. The third problem concerns the determination of optimum interval boundaries for a sample which is grouped. Approximation techniques similar to those previously demonstrated can be used to obtain group limits which are nearly optimum. (Author)

PB 158 035 $1.60

Numerical Analysis Research, U. of California, Los Angeles.
ON THE THEORY OF QUEUES WITH DYNAMIC PRIORITIES, by James R. Jackson. Rept. on Contract Nonr-233(02). 3 Nov 60, 12p. Management Sciences Research Proj. Discussion paper no. 76; AD-251 482.

DESCRIPTORS: *Operations research, Probability.

A preliminary report on simulation studies of queues subject to "due-date-like" priorities. Interest is focussed on the "tails" of the equilibrium distributions of waiting time, by priority class. An empirical hypothesis concerning the mathematical form of these "tails" is proposed and supported by computational results. (Author)

CF-61-5-54 $1.10

Oak Ridge National Lab., Tenn.
IBM 7090 GAUSSIAN INTEGRATION ROUTINES, by M. B. Emmett and S. K. Penny. May 61, 7p.

CF-61-7-88 $1.60

Oak Ridge National Lab., Tenn.
POWER TRACE ANALYSIS CODES SNAVELY AND PIP FOR THE IBM-7090, by M. L. Tobias, D. R. Vondy, and others. July 61, 13p.

ORNL-3148 $5.60

Oak Ridge National Lab., Tenn.
STRUCTURE AND USE OF ALGOL 60, by Hermann Bottenbruch. Rept. on Contract W-7405-eng-26. July 61, 55p.

IDO-16644 $4.60

Phillips Petroleum Co., Idaho Falls.
A TWO-DIMENSIONAL STEADY STATE TEMPERATURE PROGRAM FOR THE IBM-650(TDTP), by L. A. Schmittroth and A. V. Grimaud. Rept. on Contract AT(10-1)-205. Apr 61, 48p.

Computing Devices

GEAP-3702 $7.60

General Electric Co., San Jose, Calif.
THE DEVELOPMENT OF A SCHEDULING COMPUTER FOR THE BIG ROCK PLANT, by Eric S. Beckjord. Rept. on Contract AT(04-3)-361. 72p.

OTS SB-473 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
COMPUTER RESEARCH: MEDICINE, HUMAN ENGINEERING, AND LEARNING MACHINES. Aug 61, 14p. 137 refs. OTS Selective Bibliography SB-473.

DESCRIPTORS: *Computers, Medicine, *Human engineering, *Cybernetics, *Reading machines, Bibliography.

Lists 137 foreign and domestic reports on computer related research. Covers biological computers; computers in medical and surgical applications; bioelectronics in human engineering; cybernetics and bionics; artificial intelligence, brain model, learning machines like the Berceptron; computers in speech analysis and synthesis; and related reports on reading and teaching machines.

OTS SB-472 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
COMPUTERS (SUPPLEMENT TO CTR-371). Aug 61, 31p. 463 refs. OTS Selective Bibliography SB-472.

DESCRIPTORS: *Computers, *Digital computers, Bibliography

Lists 463 foreign and domestic reports on solid-state and other computers; high speed computer systems; logic systems; analog-to-digital converters; modular transistorized and other digital circuits; computer cooling and reliability; computer controlled servosystems; computers in automation, and various other computer applications. Also lists Government-Owned Patents.

MECHANICS

PB 157 531 $7.60

Fritz Engineering Lab., Lehigh U., Bethlehem, Pa.
INELASTIC LATERAL BUCKLING OF BEAMS, by T. V. Galambos. Rept. on Welded Continuous Frames and their Components, Contract Nonr-610(03). Oct 60, 73p. 19 refs. Fritz Engineering Lab. rept. no. 205A.28; AD-248 964.

DESCRIPTORS: *Beams, Buckling, Moments, Stresses, Mathematical analysis, Design.

A method is proposed for the solution of the inelastic lateral buckling problem of as-rolled wide-flange beams subjected to equal end moments. The method is based on the determination of the reduction in the lateral and the torsional stiffnesses due to yielding. An exact analytical procedure is worked out for several examples at first, and then a simplified formula is proposed which reduces the computational work considerably. Currently used empirical design procedures are checked against the results, and a possible modification of one of them is discussed. (Author)

PB 155 498 $5.60

Guggenheim Aeronautical Lab., Calif. Inst. of Tech., Pasadena.
CYLINDRICAL COUETTE FLOW IN A RAREFIED GAS ACCORDING TO GRAD'S EQUATIONS, by Daniel Kwoh-i Ai. Rept. on Hypersonic Research Project, Contract DA 04-495-ORD-1960. 15 July 60, 55p. 14 refs. Memo. no. 56; OOR rept. 1600:45-E; AD-248 352.

DESCRIPTORS: *Fluid mechanics, *Temperature, *Laminar boundary layer, Gas flow, Theory, Shear stresses, Simultaneous equations, Aerodynamics, Boundary layer, Heat transfer, Partial differential equations, Cylindrical bodies, Compressible flow

Grad's thirteen moment method is applied to the problem of the sheer flow and heat conduction between two concentric, rotating cylinders of infinite length. The problem is linearized by requiring that the Mach number is small compared with unity, and that the temperature difference between the two cylinders is small compared with the mean temperature. The solutions of the linearized Grad equations show a qualitatively correct transition of the cylinder drag from free-molecule flow to the classical Navier-Stokes regime. However, the magnitude of the curvature effect on the drag in rarefied flow is not given correctly, because Grad's distribution function ignores the wedge-like domains of influence of the two cylinders. The solution obtained for the heat transfer rate is physically unrealistic in the free-molecule flow limit, and this result is produced by a cross-coupling between the normal stresses and the radial heat flux imposed by Grad's distribution function. In this simple problem the difficulty can be eliminated by taking the normal stresses to be identically zero and employing a truncated moment method. However, in general this device cannot be utilized in problems involving curved solid boundaries, or when dissipation is considered. (Author)

PB 155 501 $5.60

Guggenheim Aeronautical Lab., Calif. Inst. of Tech., Pasadena.
SMALL PERTURBATIONS IN THE UNSTEADY FLOW OF A RAREFIED GAS BASED ON GRAD'S THIRTEEN MOMENT APPROXIMATION, by Daniel Kwoh-i Ai. Rept. on Hypersonic Research Project, Contract DA 04-495-ORD-1960. 20 Sep 60, 55p. 11 refs. Memo. no. 59; OOR rept. 1600:48-E; AD-249 056.

DESCRIPTORS: *Heat transfer, Viscosity, *Compressible flow, Gas flow, Gases, Partial differential equations.

The unsteady one-dimensional flow of a compressible, viscous and heat conducting fluid is treated, based on linearized Grad's thirteen moment equations. The fluid, initially at rest, is set into motion by some small external disturbances. The fluid field extends to infinity

in both directions; thus no length is involved, and there is no solid wall boundary existing in the problem. The nature of the external disturbances is restricted to having a unit impulse in the momentum equation and a unit heat addition in the energy equation. The disturbances are located on an infinite plane normal to the flow direction; and the responses induced correspond to fundamental solutions of the problem. The method of Laplace transforms is applied, and the inverse transforms of all quantities are obtained in integral form. Consideration was given only to certain limiting cases which correspond to small and large times from the start of the motion, compared to the average time between molecular collisions. (Author)

PB 157 707 $1.60

Naval Ordnance Lab., White Oak, Md.
CONTINUATION OF SOLUTIONS OF THE EQUATIONS OF ELASTICITY ACROSS A SPHERICAL BOUNDARY, by J. H. Bramble. Dec 59, 16p. 4 refs. Mathematics Dept. rept. M-7; NAVORD rept. 6739; AD-230 955.

DESCRIPTORS: *Elasticity, Mathematical analysis, Stresses, Spheres, Reflection, *Partial differential equations, Theory.

This report contains results of fundamental research in the mathematical theory of elasticity. It is an extension of previous work on reflection principles for solutions of the equations of elasticity and for biharmonic functions.

PB 154 584 $1.60

Polytechnic Inst. of Brooklyn, N. Y.
ON THREE DIMENSIONAL LINEAR VISCOELASTIC STRESS ANALYSIS, by J. R. M. Radok. Rept. on Contract Nonr-839(26). May 60, 12p. 6 refs. PIBAL rept. no. 565; AD-245 920.

DESCRIPTORS: *Elasticity, Viscosity, *Stresses, Analysis, Theory, Mathematical analysis, Test methods, *Mechanics.

Contents:
Elastic solutions in terms of potential functions
Quasisteady viscoelastic solutions in terms of potential functions
An application: The twisted viscoelastic sphere.

PB 156 870 $2.60

Polytechnic Inst. of Brooklyn, N. Y.
A THEORY OF INCLUSIONS IN VISCO-ELASTIC MATERIALS, by J. R. M. Radok and Clement L. Tai. Rept. on Contract Nonr-839(26). Aug 60, 21p. 18 refs. PIBAL rept. no. 575; AD-244 605.

DESCRIPTORS: *Creep, Deformation, *Failure (Mechanics), *Mechanical properties, Elasticity, Stresses, Theory.

For presentation at the Tenth International Congress of Applied Mechanics, Stresa, Italy, August 31-September 7, 1960.

PB 156 829 $2.60

Yale U., New Haven, Conn.
POINTED VERTICES IN THE YIELD SURFACE II, by Aris Phillips. Technical rept. no. 9 on Contract Nonr-609(12). Aug 60, 24p. 15 refs. AD-251 994.

DESCRIPTORS: Aluminum tubing, *Plasticity, Stresses, Load distribution

One of the most important questions in the theory of plasticity is whether pointed vertices in the yield surface exist and if they exist whether they are carried by the loading point. Although work was done concerning the existence of pointed vertices, no attempt was made to evaluate the size of these vertices. Theoretical considerations are given by means of which it is possible from experimental data to give an estimate of the size of the vertices. (Author) (See also PB 148 568)

Aerodynamics and Pneumatics

PB 158 322 $2.60

[Aeronutronic, Newport Beach, Calif.]
STABILITY CHARACTERISTICS OF CONES AND CYLINDERS AT LARGE ANGLES OF ATTACK AT MACH NUMBER 2.87, by Walter T. Davey and Carl E. Grigsby. Rept. on Contract AF 04(647)280. 13 Aug 59, 24p. Publication no. U-540; AFBMD Doc. no. 60-2094.

DESCRIPTORS: *Conical bodies, *Cylindrical bodies, Stability, *Wind tunnel models, Aerodynamics, Tests

The results of wind tunnel tests to determine the stable characteristics of slender cones and right circular cylinders at large angles of attack are presented at a test Mach number 2.87. Five cones of fineness ratio 4.5 with center of gravity locations 55.0 and 66.7 per cent body length were tested along with 3 cylinders of fineness ratios 5, 10, and 20. The L/d 4.5 cone models, which were suspended at the theoretical center of pressure, stabilized at the 0^{o} angle of attack position if released from angles less than 50^{o}. When these configurations were released at angles greater than 50^{o}, a tendency to stabilize near the 90^{o} position was indicated. The cone models which were suspended forward of the theoretical center of pressure (55 per cent) were quite stable and stabilized at 0^{o} angle of attack for all release angles. An average value of C_{N_α} of 4.75 per radian was calculated together with a corresponding center of pressure location of 68.8 per cent length. These values are averaged over an angle of attack range of $\pm 50^{o}$. The cylinder models stabilized at about 90^{o} angle of attack confirming the results of Raymond and Garber. (Author)

PB 156 574 $11.00

Armour Research Foundation, Chicago, Ill.
HYPERSONIC RECONNAISSANCE INVESTIGATION, by J. J. Burke, N. S. Kapany and others. Final rept. on Research in the Form of Experimental and Theoretical Investigation on the Influence of Hypersonic Flight on Aerial Reconnaissance, Contract AF 33(616)6322. Dec 60, 142p. 31 refs. ARF-1140-21; WADD Technical rept. 60-891; AD-250 474.

DESCRIPTORS: *Aerial reconnaissance, *Hypersonics, Hypersonic flow, *Aerial cameras, Aerial photography, *Optical images, Optics, Photographic film.

Investigations are described of the influence of near field hypersonic effects on aerial reconnaissance. Determinations were made of the aberration of the image of a point object caused by the aerodynamical conditions surrounding a hypersonic vehicle. An order of magnitude asessment was made to determine if the emission in the plasma sheath surrounding a hypersonic vehicle can cause the fogging of the film. The interferometric and high resolution photographic measurements verified that the photograph of a high contrast test object taken through the Mach 7 flow surrounding a 20-degree, wedge-shaped model suffers no degradation in resolution providing that the boundary layer covering the model surface is laminar. For the particular flight conditions chosen, the luminosity level in the plasma sheath surrounding the vehicle corresponded to an exposure on the film in a conventional aerial reconnaissance camera which was well below the fog level. (Author)

PB 157 879 $2.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
THE DYNAMIC PROPERTIES OF PURE CONE AND CONE CYLINDERS, by L. E. Schmidt. Jan 54, 29p. 15 refs. Memo. rept. no. 759.

DESCRIPTORS: *Conical bodies, *Cylindrical bodies, Aerodynamics, Physical properties.

The dynamic force and moment coefficients are presented for a pure cone and for a cone cylinder shape. The data for the cone cylinder indicates that the center of pressure for the Magnus force is very far forward for subsonic velocities and this causes all of the models fired at these velocities to be dynamically unstable. The results also indicate a negative damping moment coefficient for some center of mass positions at a Mach number of 0.8. (Author)

PB 157 711 $1.10

Ballistic Research Labs., Aberdeen Proving Ground, Md.
THE EFFECTIVENESS OF BASE-BLEED IN REDUCING DRAG OF BOAT-TAILED BODIES AT SUPERSONIC VELOCITIES, by Elizabeth R. Dickinson. Jan 60, 10p. 6 refs. Memo. rept. no. 1244; AD-234 315.

DESCRIPTORS: *Drag, *Projectiles, Supersonics, Reduction.

The effectiveness of reducing the drag of a square-based projectile by bleeding air into a hollow in the base was established by means of wind tunnel tests. A description is given of a brief free-flight experimental test and some theoretical calculations made to determine the effect of base-bleed on a boat-tailed projectile. There was no decrease in drag. (Author)

PB 157 742 $13.50

Cook Research Labs., Chicago, Ill.
REQUIREMENTS AND CONSIDERATIONS FOR TESTING HYPERSONIC RETARDATION DEVICES FOR RE-ENTRY VEHICLE RECOVERY, by Jay L. Musil. Rept. on Contract AF 04(611)3744. Mar 59, 196p. 56 refs. AFFTC-TR-59-4; AD-213 476.

DESCRIPTORS: *Hypervelocity vehicles, Atmosphere entry, *Re-entry aerodynamics, Test facilities, Recovery, Test vehicles, Drag, Deceleration, Hypersonic flow, Aerodynamics, Configuration, Satellite vehicles, Guided missiles, *Re-entry vehicles.

The technical considerations necessary to delineate and set forth the testing requirements for hypersonic retardation devices as applies to re-entry vehicle systems are discussed. Areas of effectiveness for the applications of such devices are indicated. Retardation device configurations, re-entry environmental conditions encountered, and the many factors associated with hypersonic airflows which influence the device performance are described. The capabilities and limitations of known testing techniques to evaluate the characteristics of these devices under simulated re-entry conditions and environment are pointed out. There is included a description of a possible re-entry test vehicle system suitable for the acquisition of basic and fundamental research data on re-entry vehicle retardation devices. The requirements for airborne free-flight test instrumentation, range, and ground support facilities and equipments are also indicated. (Author)

PB 155 550 $3.60

Cornell U. Graduate School of Aeronautical Engineering, Ithaca, N. Y.
SHOCK PROFILES IN HYPERSONIC FLOW OF A RELAXING GAS ABOUT A WEDGE, by Frederick R. Dressler. Rept. on Contract AF 49(638)544. Feb 61, 39p. 5 refs. AFOSR-263.

DESCRIPTORS: *Hypersonic flow, Wedges, Transformations (Mathematics), *Shock waves, Perturbation theory, Configuration, *Aerodynamics, Gases, Dissociation.

A small-perturbation technique is used to give the change in the shock inclination on a thin wedge in steady, two-dimensional, hypersonic flow. This change in shock angle is due to either dissociation or a lagging vibrational heat capacity in the flow behind the bow shock-wave. The problem is solved by transferring the physical domain into a "piston" plane with one less space dimension. The resulting unsteady, one-dimensional problem is solved here. A general result is obtained giving the shock perturbation as a function of the unperturbed-flow parameters, body shape and equilibrium conditions behind the shock. An expression for the final shock inclination is given in closed form. (Author)

PB 154 895 $8.10

Lockheed Aircraft Corp., Sunnyvale, Calif.
HIGHER APPROXIMATIONS IN BOUNDRY-LAYER THEORY, by Milton Van Dyke. Technical rept. Oct 60, 85p. 42 refs. LMSD-703097; AD-246 551.

DESCRIPTORS: Boundary layer, *Laminar boundary layer, Theory, Aerodynamics, Gas flow, Fluid mechanics.

Two aspects of the problem of improving Prandtl's laminar boundary-layer theory by successive approximations are studied. The recently developed technique of inner and outer expansions is employed. The second approximation is calculated for the boundary layer on a plane parabola at zero incidence in a uniform incompressible stream. Numerical calculations show that near the stagnation point the skin friction is reduced by the effects of both curvature and displacement. The effects upon the boundary layer of vorticity in the external flow are considered. The classical condition at the outer edge of the boundary layer must be modified to include an additional pressure gradient. As a result, the skin friction and heat transfer exceed the values calculated by some previous investigators. (Author)

PB 171 978 $1.75

National Aviation Facilities Experimental Center, Atlantic City, N. J.
A STUDY OF DESIGN REQUIREMENTS FOR A FULL-SCALE WIND TUNNEL, by John Sommers, Roy K. Hackbarth, and Eugene P. Klueg. Final rept. on Task no. 59-222. Mar 61, 67p. 15 refs.

DESCRIPTORS: *Wind tunnel, Design, Construction, Costs, *Turbojet engines, Economics.

A basic design study of high-speed subsonic wind tunnel configurations was undertaken to determine the most feasible design for use in fire testing full-scale aircraft powerplants. Three proposed designs were considered; namely, the modification of the facility used at the Indianapolis Technical Development Center, a facility using a motor-driven fan, and a facility using turbojet engines for ejector pumping. Initial costs of construction were compared. The study indicated that a wind tunnel using turbojet engines for ejector pumping as the principal power source would satisfy effectively the requirements for such a fire test facility. Of the designs considered, the induction wind tunnel is recommended as the most economical subsonic fire-test facility from the standpoint of initial cost. (Author)

PB 181 031 $9.00

Office of Naval Research, Washington, D. C.
SYMPOSIUM PROCEEDINGS: STRUCTURAL DYNAMICS OF HIGH SPEED FLIGHT. LOS ANGELES, CALIFORNIA, APRIL 24-26, 1961. [1961] 758p. 259 refs. ONR Symposium rept. ACR-62, vol. 1.

DESCRIPTORS: Symposia, *Flutter, *Vibration, *Aerodynamics, Hypersonics, Mach number, Triangular wings, Aspect ratio, Supersonic flow, Sheets, Flight, Tracks (Aerodynamics), Guided missiles, Rocket propellants, Control systems, Range, Wind, Load distribution, Airfoils, Shock tubes, Temperature, Deflection, Deformation, Fatigue (Mechanics), Structures, Spaceships, Noise.

PB 157 392 $3.60

Polytechnic Inst. of Brooklyn, N. Y.
AERODYNAMIC ANALYSIS OF A LOW DENSITY HYPERSONIC SHOCK-WIND TUNNEL, by Sergio R. Panunzio and Francis A. Vicente. Rept. on Contract Nonr-839(25). Sep 60, 33p. 9 refs. PIBAL rept. no. 617; AD-247 316.

DESCRIPTORS: *Hypersonic wind tunnels, Aerodynamic configurations, Aerodynamics, Hypersonic flow, Analysis, Simulation, *Shock tubes, Pressure, Temperature, Gas ionization, Reduction, Altitude chambers, Velocity, Model tests.

Theoretical performance data are presented for the proposed shock-wind tunnel of the Polytechnic Institute of Brooklyn. Various parameters needed to simulate test chamber conditions of altitude and velocity are presented together with the method of analysis. The appendix presents the basic equations used in the analysis. (Author)

PB 157 391 $4.60

Polytechnic Inst. of Brooklyn, N. Y.
FREE AND FORCED VIBRATIONS OF A LONG NONCIRCULAR CYLINDRICAL SHELL, by Jerome M. Klosner. Rept. on Contract Nonr-839(17). Sep 60, 45p. 16 refs. PIBAL rept. no. 561; AD-246 602.

DESCRIPTORS: *Cylindrical bodies, *Structural shells, Vibration, Stresses, Mathematical analysis, *Dynamics.

Equations that predict the response of noncircular cylindrical shells to arbitrary forcing functions are derived by use of the Lagrangian formulation. The generalized masses and forces are defined in terms of the new orthogonal modes of vibration. (Author)

SC-4544(RR) $7.60

Sandia Corp., Albuquerque, N. Mex.
AN ANALYTICAL AND EXPERIMENTAL INVESTIGATION OF STEADY AND UNSTEADY FLOW IN TUBING, WITH SPECIAL APPLICATION TO SIMULATED MISSILE PRESSURE-SENSING SYSTEMS, by Arnold L. Ducoffe and Frank M. White Jr. May 61, 77p.

PB 158 138 $2.60

Space Technology Labs., Inc., Los Angeles, Calif.
AN ELECTROMAGNETIC SHOCK TUBE FOR AERODYNAMIC RESEARCH, by Richard W. Ziemer. Rept. on Boundary Layer Research, Contract AF 04(647)127. 17 June 58, 28p. 6 refs. Rept. GM-TR-0127-00419; AFBMD Document no. 8-7061.

DESCRIPTORS: *Shock tubes, Electromagnetic properties, Design, Operation, Tests.

An electromagnetically driven shock tube has been studied as a possible new tool for aerodynamic research in which velocities of up to 41,000 feet per second are obtainable in air. At these high velocities stagnation temperatures of about 35,000°K are produced. The simple construction and operation of the shock tube is described and an evaluation is made of its performance. The potentialities and limitations of the

apparatus are discussed with regards to research applications. The results of some magneto-aerodynamic studies are presented to show the usefulness of this type of shock tube. (Author)

Hydrodynamics, Hydraulics, and Hydrostatics

PB 153 222 $6.60

Brigham Young U., Provo, Utah.
TAYLOR EXPANSIONS OF THE HYDRODYNAMIC EQUATIONS. PART I, by Keith L. McDonald. Technical rept. Nov 60, 64p.

DESCRIPTORS: *Hydrodynamics, *Fluid mechanics, *Differential equations, *Taylor's series, Vector analysis, Pressure, Velocity, Density.

The present work treats on the Taylor expansions of the two important differential equations of fluid dynamics, namely, the classical momentum equation and the equation of continuity. Two different methods of investigation are employed. In the first, the relationship between the pressure, mass density, and fluid velocity, each represented by their Taylor expansions, are obtained by equating to zero the coefficients of like terms in the rectangular coordinates in these equations. In the second method, only the velocity is expanded, in vector modes, and the pressure and density are resolved subject to standard auxiliary relationships. This procedure enables one to view the iso-pressure surfaces in the neighborhoods of singular points for various types of asymptotic velocity fields. (Author)

PB 156 066 $7.60

Brown U. Div. of Applied Mathematics, Providence, R. I.
FLOWS OF DILATANT FLUIDS, by Eric Varley. Technical rept. no. 8, Sep 59-Jan 61, on Application of Invariance Principles in Continuum Mechanics, Contract 19-020-ORD-4725. 1 Mar 61, 73p. 5 refs. DA-4725/8; OOR rept. no. 1271:31; AD-254 936.

DESCRIPTORS: *Fluid flow, Fluid mechanics, Compressible flow, *Pipes, Pipe bends, Continuum mechanics.

For a Newtonian fluid in simple shear any velocity gradient is mechanically admissible; for a dilatant fluid there exists an upper bound on the admissible velocity gradients. Constitutive equations for both compressible and incompressible dilatant fluids are constructed for general stress fields. General features of the rectilinear flow of an incompressible dilatant fluid down pipes of arbitrary cross-section and the details for a particular cross-section are given. A maximum principle for the admissible motions of the boundaries and a uniqueness theorem for steady creeping motion are also established. The equations governing the two-dimensional dilatant flow of a von Mises dilatant fluid adjacent to a rigid body are integrated and certain anomalies which arise when the Reynolds number is infinite are discussed. Three examples of unsteady shear flow are also given. For the compressible dilatant fluid the shock like structure of the dilatant layer is established and it is shown that the classical inviscid shock is a limiting case of a dilatant fluid. (Author)

PB 157 420 $2.60

New York U., N. Y.
THE APPARENT LOSS OF COHERENCY IN VECTOR GAUSSIAN PROCESSES DUE TO COMPUTATIONAL PROCEDURES WITH APPLICATION TO SHIP MOTIONS AND RANDOM SEAS, by Willard J. Pierson, Jr. and John F. Dalzell (Davidson Lab.). Rept. on Contracts Nonr-285(17) and Nonr-263(09). Sep 60, 23p. 6 refs. AD-252 589.

DESCRIPTORS: *Ocean waves, *Vector analysis, *Ships, *Motion, Mechanical properties.

The loss of coherency, when computed by standard techniques from samples of vector Gaussian processes, where, theoretically, the coherency ought to be one, is largely explained by the lack of resolution in the cross spectra and the effect of the convolving filter made necessary by the nature of the finite sample. High coherencies can be regained by modifying the experimental design so as to obtain less rapidly varying cross spectra and by increasing the resolution. (Author)

PB 157 137 $1.60

St. Anthony Falls Hydraulic Lab., U. of Minnesota, Minneapolis.
PRESSURE DISTRIBUTIONS OF A SURFACE-PIERCING DIHEDRAL HYDROFOIL, by J. M. Wetzel. Status rept. on Contract Nonr-710(04). June 55, 19p. 2 refs. Memo. no. M-35; AD-72 713.

DESCRIPTORS: *Hydrofoils, *Pressure, Test facilities, Water, Fluid flow, Hydrodynamics, Motion.

PB 155 280 $3.60

Yeshiva U., New York.
THEORY OF THE TWO- AND ONE-DIMENSIONAL RIGID SPHERE FLUIDS, by E. Helfand, H. L. Frisch (Bell Telephone Labs., Inc.) and J. L. Lebowitz. Rept. on Contract AF 49(638)753. [1960] 31p. 13 refs. AFOSR-TN-60-1343.

DESCRIPTORS: Statistical functions, Particles, Thermodynamics, Equations of state, *Spheres, *Fluids, Theory, *Fluid mechanics, Gases, Molecules, Density, Numerical methods and procedures.

The approximate theory of the three-dimensional hard sphere fluid developed by Reiss, Frisch and Lebowitz has given astonishingly good predictions with little labor. In an attempt to investigate the reason for this result we adduce, in this paper, further evidence for the internal consistency of the approximations of this theory. Thus it is noted that the same equation of state of hard sphere fluid is obtained when one used the "integral condition" as when the "infinity condition" is used. We have then applied the theory to study the thermodynamic properties, in particular the equation of state, of the rigid sphere fluid in two and one dimensions. The approximate equation of state of the two-dimensional rigid sphere fluid is in good agreement over the range of fluid densities with the results of the machine Monte Carlo calculations by Jacobson and Wood and dynamical machine calculations of Wainwright and Alder. The exact Tonks' equation of state of the one-dimensional rigid sphere fluid is derived in a particularly simple manner. (Author)

METALLURGY

USBM-U-839 $0.75

Albany Metallurgy Research Center, Ore.
METALLURGICAL PROGRESS REPORT NO. 11, 1 Apr-30 June 61 on Contract AT(11-1)-599. 34p.

NAA-SR-MEMO-6108 $1.10

Atomics International, Canoga Park, Calif.
THORIUM, by M. Bloomfield. June 61, 10p.

BMI-1537 $1.00

Battelle Memorial Inst., Columbus, Ohio.
ELECTROPLATES ON THORIUM AND URANIUM FOR CORROSION PROTECTION AND TO AID JOINING, by John G. Beach and Charles L. Faust. Rept. on Contract W-7405-eng-92. Aug 61, 37p.

BMI-1230 $1.60

Battelle Memorial Inst., Columbus 1, Ohio.
HIGH-TEMPERATURE OXIDATION RESISTANCE OF THIN IRON-CHROMIUM-ALUMINUM ALLOY SHEET, by Edward J. Jablonowski, Frederic R. Shober, and Ronald F. Dickerson. Rept. on Contract W-7405-eng-92. Oct 57, 11p.

GA-1896 $1.75

General Atomic Div., General Dynamics Corp., San Diego, Calif.
CHEMISTRY OF URANIUM-OXYGEN SYSTEM, by C. F. Miller, Ulrich Merten, and J. T. Porter. Final rept. on Contract AT(04-3)-167. Jan 61, 65p.

GA-2314 $2.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
A PROGRAM OF RESEARCH ON MECHANICAL METALLURGY AS RELATED TO FUEL-ELEMENT FABRICATION, by T. A. Trozera, J. L. White, and R. H. Chambers. Quarterly progress rept. ending 31 Mar 61 on Contract AT(04-3)-167. July 61, 29p.

APEX-623 $2.00

General Electric Co., Cincinnati, Ohio.
PHYSICAL AND MECHANICAL PROPERTIES AND OXIDATION-RESISTANT COATINGS FOR A TUNGSTEN-BASE ALLOY, by W. G. Baxter and F.H. Welch. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. July 61, 89p.

GEAP-3609 $1.75

General Electric Co., San Jose, Calif.
HIGH POWER DENSITY DEVELOPMENT PROJECT. DESIGN AND FABRICATION OF HIGH POWER DENSITY FUEL ASSEMBLIES FOR VBWR IRRADIATION TESTING, by W. D. Fowler and J. W. Lingafelter. Nov 60, 76p.

GEAP-3623 $1.60

General Electric Co., San Jose, Calif.
SWAGING OVER UNGROUND PELLETS, by R. L. Brown. Rept. on Contract AT(04-3)-361. Jan 61, 12p.

HW-66693 $3.60

Hanford Atomic Products Operation, Richland, Wash.
TENSILE PROPERTIES OF IRRADIATED THORIUM, by A. L. Bement, Jr. Rept. on Contract AT(45-1)-1350. 1 Sep 60, 32p.

TID-12948 $3.60

Illinois U., Urbana.
DIFFUSION IN METALS. Progress rept. on Contract AT(11-1)-67. June 61, 37p.

PB 158 144 $1.60

Kaman Nuclear, Colorado Springs, Colo.
DEVELOPMENT AND FABRICATION OF NON-DESTRUCTIVE SPECIFIC GRAVITY MEASURING EQUIPMENT EMPLOYING RADIATION TECHNIQUE. Monthly progress rept. 1-30 Sep 60, on Contract DA 19-059-501-ORD-2631. Sep 60, 12p. Rept. no. 58-92-PR-25; AD-244 251.

DESCRIPTORS: *Non-destructive testing, Design, Gravity, Measurement, Test equipment, Test facilities, *Density sensitive indicators; Radiographic analysis, *Radiation instruments, Physical properties, Servo systems.

Effort during this period was utilized to complete checks of clearance for the length measurement system, to initiate detailed design of the measurement probe carriage assembly, and for procurement of the beam attenuator assembly and the table. (Author)

MIT-1113(Del) $14.50

Massachusetts Inst. of Technology, Cambridge.
TECHNICAL PROGRESS REPORT FOR THE PERIOD APRIL-JUNE 1953 on Contract AT(30-1)-981. Sep 53, declassified. 216p.

PB 158 191 $1.60

Naval Ordnance Test Station, China Lake, Calif.
HIGH-HEATING-RATE STRENGTH OF THREE HEAT-RESISTANT METALS, by B. A. Miller, J. M. Winward, and W. K. Smith. 16 Mar 53, 17p. 8 refs. NAVORD rept. 2017; NOTS 670; AD-10 850.

DESCRIPTORS: *Heat resistant alloys, Mechanical properties, Temperature, *Stainless steel, *Molybdenum, Rockets, Test methods, Metals, Ordnance, High temperature research, Determination, Alloys

High-heating-rate (hhr) strengths were determined by subjecting Mo, Hastelloy C, and type-303 stainless steel to constant load and to a heating rate of 400°F/sec. The hhr strength of wrought, sintered, pure Mo above 1600°F exceeded those of the other metals. Hastelloy C in a precipitation-hardened condition was stronger

than in a solution-annealed condition up to about 1750°F. Both Hastelloy C specimens were superior to type-303 steel down to 1400°F, below which the cold-worked stainless steel was stronger. Cold-worked type-303 steel had an hhr strength superior to that of the annealed steel.

TID-13339 $2.60

Nuclear Development Corp. of America, White Plains, N. Y.
AN INVESTIGATION OF DISPERSION HARDENING IN THE URANIUM-URANIUM DIOXIDE SYSTEM, by W. Arbiter. May 60, 28p.

CF-61-4-69 $1.60

Oak Ridge National Lab., Tenn.
EVALUATION OF ELECTROLESS NICKEL BRAZED TUBE BUNDLES: by R. S. Crouse. Apr 61, 14p. Metallography rept. no. 387.

CF-60-1-54 $1.10

Oak Ridge National Lab., Tenn.
NI-O-NEL VERSUS HASTELLOY F AS A MATERIAL OF CONSTRUCTION FOR SULFEX PROCESS EQUIPMENT, by W. E. Clark. Jan 60, 7p.

CF-61-7-24 $1.60

Oak Ridge National Lab., Tenn.
PROGRESS REPORT ON BRAZING OF COLUMBIUM, by C. W. Fox and R. G. Gilliland. 5 July 61, 20p.

SCTM-316-59(16) $2.60

Sandia Corp., Albuquerque, N. Mex.
THE COLD WELDING OF METALS, by D. W. Grobecker. Jan 60, 23p.

SCNC-329 $3.60

Sylcor Div., Sylvania Electric Products Inc., Bayside, N. Y.
IRRADIATION OF URANIUM-YTTRIUM ALLOYS, by S. D. Strauss and J. L. Zambrow. Rept. on Contract AT-30-1-GEN-366. Aug 61, 31p.

CVNA-86 $3.60

Westinghouse Electric Corp., Pittsburgh, Pa.
EVALUATION OF CONTROL ROD MATERIALS, Sub-Task 6.03, by L. Marti-Balaguer and W. R. Smalley. Terminal rept. on Contract AT(30-1)-2289. [1960] 31p.

Ferrous Metals

PB 181 025 $5.00

Convair, San Diego, Calif.
CORRELATION OF TENSILE PROPERTIES OF STEEL CASTINGS AND MATERIAL IMPERFECTIONS AS DETERMINED BY RADIOGRAPHY, by L. J. Mattek and R. D. Woodward. Summary rept. June 59-July 60, on The Chemistry and Physics of Materials, Contract AF 33(616)6622. Feb 61, 311p. 6 refs. WADD Technical rept. 60-450.

DESCRIPTORS: *Steel castings, Tensile properties, Statistical analysis, *Radiography, Deformation, Elasticity, Porosity, Castings.

The relationships between tensile properties of 410 stainless-steel castings and imperfections, as determined by radiography, have been investigated. The purpose was to establish confidence in a system of evaluating castings by radiographic inspection. Tensile properties investigated were: Tensile yield, tensile ultimate, elongation and modulus of elasticity; imperfections were: Gas holes, inclusions and porosity; thicknesses were: 0.1", 0.2", 0.3" and 0.6". Test specimens were heat treated to a 180,000 to 200,000 psi. Statistical analysis of test results is presented. Relationships between tensile properties and size or intensity of imperfections are represented in tables and graphs. (Author)

PB 157 900

Naval Radiological Defense Lab., San Francisco, Calif.
THE THERMAL DIFFUSIVITY OF STAINLESS STEEL OVER THE TEMPERATURE RANGE 20°C-1000°C, by R. J. Jenkins and R. W. Westover. 5 Dec 60, 17p. 3 refs. Research and development technical rept. USNRDL-TR-484; AD-249 578.

DESCRIPTORS: *Stainless steel, *Thermal diffusion, Martensite, Austenite, Measurement, Test equipment, Xenon lamps, Test methods, Heat transfer, Thermocouples.

The thermal diffusivities of 12 different stainless steels are reported over the temperature range from 20 to 1000 degrees C. The thermal diffusivities of the austenitic stainless steels are in the range 0.03 - 0.04 (sg cm)/sec at 20 degrees and increase nearly linearly with no discontinuities to near 0.05 (sq cm)/sec at 1000 degrees C. The martensitic stainless steels start at thermal diffusivities of 0.05 - 0.07 (sq cm)/sec at 20 degrees C, decrease to about 0.03 (sq cm)/sec near 700 degrees C and then increase in thermal diffusivity over the rest of the temperature range studies. The thermal diffusivities measured were stable and did not change in several hours at temperature. (Author)

Light Metals

APEX-649 $0.50

General Electric Co., Cincinnati, Ohio.
TAPPED HOLES IN BERYLLIUM, by A. D. Feith. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. Aug 61, 19p.

UCRL-5705(Suppl. 1) $5.60

Lawrence Radiation Lab., U. of California, Livermore.
CURRENT BERYLLIUM LITERATURE, by Zanier D. Lane. A selected bibliography. Rept. on Contract W-7405-eng-48. May 61, 56p.

NMI-1238 $1.75

Nuclear Metals, Inc., Concord, Mass.
IMPURITY EFFECTS IN COMMERCIALLY PURE BERYLLIUM, by S. H. Gelles and A. K. Wolff. Rept. on Contract AT(30-1)-1565. Feb 61, 73p.

Structural Metallurgy and Corrosion

APAE-83 $1.60

Alco Products, Inc., Schenectady, N. Y.
SUITABILITY OF INCONEL FOR CORROSION PROTECTION ON WATER SIDE OF SODIUM COMPONENT STEAM GENERATOR, by Laurence E. Phillips and Frank J. Vawter. Rept. on Contract AT(11-1)-666. Mar 61, 24p.

PB 156 995 $4.60

Battelle Memorial Inst., Columbus, Ohio.
METALLURGICAL RESEARCH AND DEVELOPMENT IN ELECTRON DEVICES, by D. J. Maykuth, G. S. Root and others. Quarterly progress rept. no. 2, 15 Mar-14 June 59, on Contract DA 36-039-sc-78253. [1959] 42p. 15 refs. AD-226 882.

DESCRIPTORS: *Electron tubes, Materials, Niobium, Hafnium, *Hafnium compounds, *Niobium alloys, Wire, *Molybdenum, Nickel, Mechanical properties, Welding.

High-purity columbium, hafnium, and a number of binary alloys with both base metals are being fabricated to wire and evaluated to determine their applicability for use as grid and construction materials in electron-tube devices. Fifteen-mil-diameter wires of unalloyed columbium and of Cb-0.65Zr and Cb-40Ta alloys were prepared, and resistivity measurements at temperatures up to 1700 C were obtained for the unalloyed metal. A suitable contamination-free fabrication procedure for reducing hafnium ingots to square wire was established, and ingots from four separate lots of unalloyed hafnium, of varying purity, were processed to wire. Arc melting was also completed on binary hafnium-base alloys containing additions of 5 and 10 per cent zirconium and 2.5 and 5 per cent each of aluminum and molybdenum. A survey of the literature on metals joining as applied to electron tube manufacturing was completed. (Author) (See also PB 155 739)

PB 156 996 $3.60

Battelle Memorial Inst., Columbus, Ohio.
METALLURGICAL RESEARCH AND DEVELOPMENT IN ELECTRON DEVICES, by D. J. Maykuth, G. S. Root and others. Quarterly progress rept. no. 3, 15 June-14 Sep 59, on Contract DA 36-039-sc-78253. [1959] 33p. 5 refs. AD-228 433.

DESCRIPTORS: *Electron tubes, Materials, Niobium, Hafnium, *Hafnium compounds, *Niobium alloys, Wire, Molybdenum, Nickel, Mechanical properties, Welding, Joints.

Fine wires of unalloyed columbium and columbium alloys containing 0.65 per cent zirconium or 40 per cent tantalum show moderate room-temperature strengths and exceptionally good ductility. Resistivity versus temperature curves for each of these materials have been determined up to 1700 C. A procedure for fabricating unalloyed hafnium to wire has been established, and preparation of a series of binary hafnium alloys is in process. Laboratory studies are in process to evaluate the effects of welding and metallurgical variables on the properties of welds between molybdenum wires and between molybdenum and nickel wires. The joint strengths of resistance-welded molybdenum-molybdenum cross-wire welds were shown to be a function of the mechanical properties of the recrystallized molybdenum metal in the weld areas. Other variables studied included the use of argon shielding gas, alternating current, and nickel foil sandwiches between the molybdenum wires. (Author) See also PB 156 995

AD-260 238 $1.25

Bureau of Supplies and Accounts, Navy Dept., Washington, D. C.
CORROSIVITY OF CUSHIONING MATERIALS, by S. Stambler and S. Gordon. 16 Feb 61, 48p. 1 ref. Engineering rept. no. 2.50602.

DESCRIPTORS: Metals, *Packaging, *Corrosion, Chemical properties, Corrosion research, Hydrogen ion concentration, Electrolytes, Test methods.

Representative cushioning and packaging materials were tested to determine the relationship, if any, between physical and chemical test results and compatibility of cushioning materials and packaged metal items. It was determined that chemical properties of packaging materials such as pH and acid or alkaline content, and electrolyte content, are unreliable indicators of cushioning material corrosivity. A stack type compatibility test that will indicate cushioning material corrosivity was developed. (Author)

PB 157 534 $3.60

Carnegie Inst. of Tech., Pittsburgh, Pa.
STRESS CORROSION CRACKING OF SINGLE CRYSTALS OF SOME AUSTENITIC STAINLESS STEELS, by R. E. Reed and H. W. Paxton. Rept. on Contract Nonr-760(14). 1 Oct 60, 37p. 32 refs. AD-248 457.

DESCRIPTORS: *Corrosion, *Stainless steel, *Single crystals, Austenite, *Corrosion research, Microstructure, Metallic crystals, Fracture (Mechanics), Crystal structure, Stresses, Failure (Mechanics).

Fe-20Cr-20Ni, Fe-20Cr-12Ni, and commercial type 304 stainless steel single crystals were loaded in tension in boiling 42% MgCl2 solution. The commercial type 304 stainless steel cracked or fractured in 4 to 17 hours, the Fe-20Cr-12Ni in 16-62 hours, and the Fe-20Cr-20Ni in 70-170 hours. The crack in all three alloys nucleated from elongated pits formed when portions of slip lines were attacked by the solution. The crack plane of the Fe-20Cr-20Ni specimens followed the (100) plane with the highest normal stress upon it. This is believed to be the first time that brittle cracks have been noted to follow a particular crystallographic plane in fcc material. The general crack plane in type 304 and Fe-20Cr-12Ni specimens was approximately

normal to the tensile axis. Electron micrographs of the fracture surface on a type 304 specimen revealed possible crystallographic steps on a small scale. It is proposed that the mechanism for this process probably consists of two stages: (1) a slow electrochemical crack initiation and re-initiation step and (2) a rapid mechanical fracture step. (Author)

PB 153 789 $1.60

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
THE ACTION OF SOME CORROSION INHIBITORS IN AUTOMOTIVE COOLANT MEDIA ON THE POLARIZATION CHARACTERISTICS OF SOLDER AND COPPER, by Milton Levy. 22 Jan 58, 17p. 4 refs. Rept. no. CCL #44; AD-153 309.

DESCRIPTORS: *Freezing point depressants, *Coolants, Corrosion, Internal combustion engines, Cooling, *Metals, Corrosion inhibition, Silver solders, Copper, Polarization

This investigation deals with the action of some corrosion inhibitors in automotive coolant media on the polarization characteristics of solder and copper, the critical metals in the automotive cooling system. The effect of inhibitor addition on the galvanic attack produced by the coupling of solder and copper in both tap H_2O and 30% ethylene glycol solutions has been studied. A general correlation exists between the action of these inhibitor materials on the polarization characteristics of steel, copper and solder and results of an accelerated glassware corrosion test and simulated vehicle cooling system test developed at this laboratory. The polarization technique with externally applied EMF is useful as a test for the evaluation and screening of inhibitors. (Author)

PB 152 692 $4.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
HIGH TEMPERATURE STRAIN AND TEMPERATURE SENSING DEVICES. A PRELIMINARY LITERATURE SURVEY, by A. A. Beltran. 9 May 60, 50p. 118 refs. Special Bibliography SB-60-3; AD-240 655.

DESCRIPTORS: *Calorimeters, *Strain gages, High temperature research, *Thermocouples, Adhesives, *Airframes, *Heat resistant alloys, Mechanical properties, Ceramic materials, Steel, Beryllium, Graphite, Bibliography, Titanium, Test equipment, *Refractory materials, Manufacturing methods, Measurement

This bibliography lists and abstracts some of the literature sensing devices in the temperature range from ambient to 1500°F (815°C). It also briefly covers measurement techniques, adhesives for the strain and temperature sensing instruments, and these instruments applied specifically to beryllium, pyrolytic graphite, steel and titanium. The reports quite frequently include tests results as well as test equipment and procedures. Arrangement of the items in this bibliography is as follows: Instruments and Techniques: (a) Adhesives, (b) Ice Calorimeters, (c) Strain Gages, (d) Techniques, (e) Thermocouples; Materials Tested: (a) Aircraft Structural Materials, (b) Beryllium, (c) Pyrolytic Graphite, (d) Steel, (e) Titanium. (Author)

PB 158 141 $1.60

Naval Engineering Experiment Station, Annapolis, Md.
CORROSION OF MATERIALS IN HIGH VELOCITY SEA WATER, by J. L. Basil. Progress rept. no. 1. 30 Dec 60, 13p. 1 ref. Research and Development Rept. 910160A.

DESCRIPTORS: *Nickel alloys, *Copper alloys, *Titanium alloys, *Stainless steel, *Corrosion, *Sea water, Metals, Alloys.

Tests were conducted for 30 days at a water velocity of 135 fps. Stainless steels and nickel and titanium alloys showed low corrosion rates, ranging from 0.0002 to 0.0006 inches penetration per year (ipy). Corrosion rates of copper and aluminum alloys were more than 100 times greater, ranging from 0.034 to 0.083 ipy. Low alloy steels exhibited more variation in results and ranged from 0.057 to 0.22 ipy. (Author)

CF-55-3-159 $1.10

Oak Ridge National Lab., Tenn.
CORROSION OF STRUCTURAL MATERIALS BY PROPYLENEDIAMINE HYDROCHLORIDE, by N. A. Krohn and G. A. West. July 61, 3p.

CVNA-85 $3.60

Westinghouse Electric Corp., Pittsburgh, Pa.
BRAZING ZIRCALOY FUEL ASSEMBLY COMPONENTS FOR THE CVTR, by P. P. King. Terminal rept. on Contract AT(30-1)-2289. 40p.

CVNA-87 $3.60

Westinghouse Electric Corp., Pittsburgh, Pa.
CONOSEAL GASKET CREVICE CORROSION STUDY, by C. J. Kubit. Terminal rept. on Contract AT(30-1)-2289. 36p.

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

TID-13165 $1.10

DETERMINATION OF α FOR U^{235} IN THE INTERMEDIATE ENERGY SPECTRUM BY ANALYSIS OF URANIUM FUEL FROM A Be MODERATED INTERMEDIATE SPECTRUM LATTICE, by E. B. Fehr, E. C. Hansen and others. 17 July 61, 9p.

NAA-SR-MEMO-6107 $1.60

Atomics International Canoga Park, Calif.
RUTHENIUM REMOVAL FROM IRRADIATED UO_2 BY REACTION WITH OXYGEN TO 1300°C, by I. J. Colby, Jr. June 61, 12p.

BMI-X-174 $1.60

Battelle Memorial Inst., Columbus, Ohio.
RADIOISOTOPE AND RADIATION APPLICATIONS, ed. by Duane N. Sunderman. Quarterly progress rept. on Contract W-7405-eng-92. July 61, 14p.

PB 156 071 $9.60

California U., Los Angeles.
APPLICATION OF A SIMPLIFIED BRUECKNER TECHNIQUE TO NUCLEAR MATTER, by Bruce Laurence Scott. Thesis. Technical rept. no. 4 on Contract DA 04-495-ORD-1648. June 60, 117p. 38 refs. OOR rept. no. 1784:20; AD-253 765.

DESCRIPTORS: *Nuclear reactions, Nuclear physics, Particles, Quantum statistics, Perturbation theory, *Nucleons, Nuclear energy.

Contents:
Theory
Calculation with central potentials
Details of the calculations
Calculations with a standard potential
Effect of changing various parameters
Effect of the cut-off distance
Extension to tensor forces
Theory
The Schrodinger equation with tensor interaction
Calculations
Conclusion

TID-13122 $1.60

Connecticut., Storrs.
INVESTIGATIONS OF RADIATION EFFECTS IN METAL OXIDES AND AZIDES BY ELECTRON SPIN RESONANCE, by Otis R. Gilliam. Progress rept. 16 Mar 60-31 Jan 61, on Contract AT(30-1)-2047. 31 Jan 61, 19p.

GAMD-1027 $2.60

General Atomic, San Diego, Calif.
Sn SLAB, N REGIONS, by J. H. Alexander and P. C. Kaestner. Rept. on Contract AT(04-3)-187, Proj. 40. 5 Oct 59, 28p.

GA-2144 $3.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
THE TRANSPIRATION METHOD, by Ulrich Merten and Wayne E. Bell. Rept. on Contract AT(04-3)-164. July 61, 36p.

PB 171 988 $0.75

Naval Ordnance Lab., White Oak, Md.
IMPROVEMENTS IN IONOGRAPHY (A NEW PROCESS OF RADIOGRAPHIC IMAGING), by R. A. Youshaw, J. A. Holloway and E. L. Criscuolo. 18 Jan 60, 27p. 4 refs. NAVORD rept. 6154; AD-234 139

DESCRIPTORS: *X-rays, Gas ionization, *Electrostatic generators, *Radiography, Instrumentation, Photons, Absorption, Photoelectrons, Radiographic analysis, *Ordnance, Non-destructive testing.

The current status of ionography, a process of X-ray imaging on inexpensive vinyl employing electrostatic principles is reviewed to date. Experimental data are presented on the relation between the mesh to vinyl distance and the image quality and speed of exposure. The ionographic phenomenon of image enlargement is discussed. Alternate techniques for forming an ionographic image are described. (Author)

PB 158 319 $8.10

Naval Radiological Defense Lab., San Francisco, Calif.
NEUTRON DISTRIBUTIONS NEAR AN AIR-SOIL BOUNDARY, by W. E. Thompson, J. M. Ferguson, and R. L. Mather. 18 Nov 60, 86p. 9 refs. Research and Development technical rept. USNRDL-TR-478; AD-247 595.

DESCRIPTORS: *Nuclear weapons, *Air blast, *Neutrons, Distribution, Air, *Soils, Mathematical prediction, Scattering, Diffusion, *Thermal neutrons, *Neutron scattering, *Radioactivation analysis.

A method was sought for predicting the energic and spatial distributions of neutrons on either side of any given air-soil boundary following an air burst of a nuclear weapon. Solutions requiring an infinite medium were not applicable because of the boundary. The method found involves the iterative "multiplication" of matrices representing spatial and energic scattering probabilities. The method is restricted to distances from ground zero greater than the burst height. A machine computation was performed using the composition of Nevada Test Site soil as parameters. (Author)

CF-60-5-34 $2.60

Oak Ridge National Lab., Tenn.
HAZARDS AND EXPERIMENTAL PROCEDURE EVALUATION FOR: "STUDIES ON THE POLYMERIZATION AND HYDROLYSIS OF PLUTONIUM IN URANYL NITRATE AND NITRIC ACID SOLUTION AT ELEVATED TEMPERATURES, by R. E. Biggers and D. A. Costanzo. 9 May 60, 28p.

CF-61-6-87 $6.60

Oak Ridge National Lab., Tenn.
MULTIGROUP NEUTRON CROSS SECTIONS, by C. W. Nestor. June 61, 61p.

CF-61-5-55 $1.10

Oak Ridge National Lab., Tenn.
THE PRODUCTION OF Ge^{68}, by Geoffry I. Gleason and John L. Need. May 61, 9p.

TID-12858 $6.60

Radiation Lab., U. of Notre Dame, Ind.
SUMMARY OF PROCEEDINGS OF THE FOURTH INFORMAL CONFERENCE ON THE RADIATION CHEMISTRY OF WATER, ed. by J. W. Falconer, K. C. Kurien and others. Rept. on Contract AT(11-1)-38. Mar 23-25, 1961, 68p.

Elementary Particles

TID-13219 $3.60

Mass. Inst. of Tech., Cambridge.
GENERALIZED FREE FIELDS AND MODELS OF LOCAL FIELD THEORY, by O. W. Greenberg. Rept. on Contract AT(301-1)-2098. 31p. [1961].

TID-12795 $1.10

Massachusetts Inst. of Technology, Cambridge
SYSTEMATICS OF ENERGIES OF STATES OF ELEMENTARY PARTICLES, by David Garelick. May 61, 6p.

Instruments and Installations

ANL-6278 $0.50

Argonne National Lab., Ill.
PULSED EDDY CURRENT INSTRUMENT FOR MEASURING SODIUM LEVELS OF EBR-II FUEL RODS, by Kunio Ono and W. J. McGonnagle. Rept. on Contract W-31-109-eng-38. July 61, 24p.

AD-258 639 $1.60

Army Electronic Proving Ground, Fort Huachuca, Ariz.
TABLES FOR COMPUTATION OF DATA FROM NET AND TOTAL REDIOMETERS, by Glenn E. Daniels. Technical memo. Dec 60, 16p. Rept. no. AEPG-SIG 970-37.

This report released by the cognizant military agency for sale to the public 21 Sep 61.

DESCRIPTORS: *Radiometers, *Meteorological instruments, Radiation counters, Radiation instruments, Tables, Equations, Temperature.

Equations have been derived and tables prepared to simplify the computation of total and net radiation data from radiometers of the Gier-Dunkle type. (Author)

BNL-5622 $2.60

Brookhaven National Lab., Upton, N. Y.
DROP COUNTER, by S. C. Goscinski. 26 June 61, 22p.

DLCS-3380101 $4.60

Duquesne Light Co., Shippingport, Pa.
CALIBRATION OF CORE FLOW INSTRUMENTATION, CORE I, SEED 2. 15 May 61, 44p.

DLCS-3370101 $1.60

Duquesne Light Co., Shippingport, Pa.
PERIODIC CALIBRATION OF REACTOR PLANT FLOW INSTRUMENTATION, CORE I, SEED 2. 14 Apr 61, 16p.

APEX-748 $1.25

General Electric Co., Cincinnati, Ohio.
D14OE1 HEATING RATE SENSOR PROGRAM CLOSING REPORT, by R. R. Swope. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. July 61, 40p.

HW-SA-2140 $3.60

Hanford Atomic Products Operation, Richland, Wash.
A REPRODUCIBLE PRECISION POLYETHYLENE LONG COUNTER FOR MEASURING FAST NEUTRON FLUX, by J. De Pangher. Rept. on Contract W-31-109-eng-52. Apr 61, 35p.

UCRL-6292-T $1.60

Lawrence Radiation Lab., U. of California, Livermore.
THE LIVERMORE 90-INCH-CYCLOTRON NEUTRON-TIME-OF-FLIGHT FACILITY, by John D. Anderson and Calvin Wong. Rept. on Contract W-7405-eng-48. Apr 61, 18p.

TID-13182 $4.60

Michigan State U., East Lansing.
PERFORMANCE ESTIMATES FOR INJECTOR CYCLOTRONS, by H. G. Blosser and M. M. Gordon. May 61, 46p.

CF-61-5-109 (Suppl. 1) $1.10

Oak Ridge National Lab., Tenn.
CALIBRATION OF IONIZATION GAUGES IN A MAGNETIC FIELD, by C. E. Normand. June 61, 8p.

TID-13491 $8.10

Purdue U., Lafayette, Ind.
A STUDY OF THE MECHANISM OF THE POISONING OF PROPORTIONAL COUNTERS, by Charles F. Smith, Jr. Rept. on Contract AT(11-1)-694. Oct 60, 90p.

DP-584 $0.50

Savannah River Lab., Aiken, S. C.
ELECTRON MULTIPLIER AS A DETECTOR FOR A SURFACE IONIZATION MASS SPECTROMETER - PERFORMANCE, by P. J. P. Chastagner. Rept. on Contract AT(07-2)-1. July 61, 11p.

TID-12685 $1.60

Yale U., New Haven, Conn.
YALE STUDY ON HIGH INTENSITY PROTON ACCELERATORS, by R. L. Gluckstern. Internal rept. on Contract AT(30-1)-2726. Apr 61, 19p.

Nuclear Engineering and Power

TID-13156 $1.10

Aeroprojects Inc., West Chester, Pa.
DEVELOPMENT OF ULTRASONIC ROLL-BOND CLADDING FOR PLATE-TYPE FUEL ELEMENTS. Monthly progress rept. no. 5, 1-31 May 61, on Contract AT(30-1)-1836, Task 5. July 61, 7p.

APAE-M-286 $9.60

Alco Products, Inc., Schenectady 1, N. Y.
FLUX AND POWER DISTRIBUTIONS FOR THE SM-2 REFERENCE AND CRITICAL EXPERIMENT CORES, by B. E. Fried, M. R. Alford, and J. P. Oggerino. Rept. on Contract AT(30-3)-326. 30 June 61, 113p.

APAE-87 $9.60

Alco Products, Inc., Schenectady, N.Y.
SM-1 RESEARCH AND DEVELOPMENT PROGRAM: DECONTAMINATION OF SM-1 PRIMARY SYSTEM TASK XVI - PHASE I, by L. F. Donovan. Rept. on Contract AT(30-3)-326. June 61, 129p.

APAE-MEMO-291 $8.10

Alco Products, Inc., Schenectady, N. Y.
THE USE OF SM-2 ELEMENTS IN SM-1, SM-1A AND PM-2A CORES, by S. L. Davidson and J. P. Oggerino. Interim rept. on Contract AT(30-1)-2639. June 61, 102p.

ACNP-6114 $6.60

Allis-Chalmers Co., Milwaukee, Wis.
PROTOTYPE RECIRCULATION PUMP TESTS, by Richard Haugen and D. J. Nolan. Summary rept. on Contract AT(11-1)-589. July 61, 64p.

ACNP-6113 $2.60

Allis-Chalmers Co., Milwaukee, Wis.
RADIOGRAPHIC PROOF-TESTING OF PROPOSED REACTOR-VESSEL NOZZLE AND ATTACHMENT-WELD DESIGNS, by J. F. Patterson, H. B. Norris, and J. F. Potochnik. Rept. on Contract AT(11-1)-589. June 61, 24p.

ARF-1167-12 $3.60

Armour Research Foundation, Chicago, Ill.
FEASIBILITY STUDY OF A NEW MASS FLOW SYSTEM, by J. W. Haffner. Quarterly rept. no. 4, 1 Mar - 31 May 61, Contract AT(11-1)-578. 23 June 61, 32p.

NAA-SR-M-6239 $4.60

Atomics International, Canoga Park, Calif.
CONCEPTUAL DESIGN - FUEL ELEMENT SELECTION AND CORE PERFORMANCE, by J. D. Wilde. 29 Mar 61, 49p.

NAA-SR-M-5775 $1.10

Atomics International, Canoga Park, Calif.
DESIGN, FABRICATION AND INSTALLATION OF SRE FUEL ELEMENT GUIDE ASSEMBLY 7519-44741", by E. R. Noise and G. C. Gower. 25 Nov 60, 10p.

NAA-SR-M-3228 $1.10

Atomics International, Canoga Park, Calif.
FUEL BURN-UP STUDY OF HNPF REFERENCE CORE, by R. A. Blaine. 7 Nov 58, 5p.

NAA-SR-M-6296 $2.60

Atomics International, Canoga Park, Calif.
NUCLEAR CHEMICAL PLANT DESIGN--CRITICALITY CONSIDERATIONS, by N. Ketzlach. 18 Apr 61, 21p.

NAA-SR-Memo-6414 $1.10

Atomics International, Canoga Park, Calif.
NUCLEAR SAFETY IN HANDLING 10 PERCENT U^{235}-ENRICHED UO_2 FUEL, by N. Ketzlach. May 61, 4p.

NAA-SR-M-6285 $1.10

Atomics International, Canoga Park, Calif.
PROPOSED EXPERIMENTS RELATED TO BURNUP, by L. S. Beller. 2 May 61, 11p.

NAA-SR-MEMO-3552 $2.60

Atomics International, Canoga Park, Calif.
RADIAL THERMAL AND FAST NEUTRON FLUX DISTRIBUTIONS IN THE SODIUM REACTOR EXPERIMENT(SRE) AND IN THE TITLE I CONFIGURATION OF THE HALLAM NUCLEAR FACILITY(HNPF), by P. J. Legendre. Mar 59, 36p.

NAA-SR-M-2805 $1.10

Atomics International, Canoga Park, Calif.
REACTIVITY IN SRE OF THE BETTIS ALLOY, by J. J. McClure. 21 May 58, 5p.

NAA-SR-M-5084 $2.60

Atomics International, Canoga Park, Calif.
REPLACING SPENT FUEL ELEMENTS WITH NEW FUEL ELEMENTS ON THE REACTOR FUEL ELEMENT SHIELD PLUGS AT HNPF, by E. C. Turner. 21 Mar 60, 23p.

NAA-SR-M-4546 $1.60

Atomics International, Canoga Park, Calif.
STRUCTURAL ANALYSIS OF THE BOTTOM HEAD OF THE REACTOR VESSEL, by H. L. Sujata. 4 Apr 61, 16p.

NAA-SR-M-6270 $4.60

Atomics International, Canoga Park, Calif.
STRUCTURAL EVALUATION OF HNPF U-MO FUEL ELEMENTS, by F. J. Waters. 12 Apr 61, 49p.

NAA-SR-M-6374 $1.60

Atomics International, Canoga Park, Calif.
TORQUE TUBE SEAL - OIC FLOW CONTROLLER, by D. J. Hovley. 8 May 61, 7p.

PB 154 978 $1.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
A METHOD FOR REDUCING ENERGY VARIATIONS OF A VAN DE GRAAFF ION BEAM, by John D. Baldeschwieler and Thomas R. Jeter. Nov 60, 19p.

11 refs. Memo. rept. no. 1312; AD-251 959.

DESCRIPTORS: *Van de Graaff generators, *Particle accelerators, *Ion beams, Energy

Signals from the slit control system and the terminal of a Van de Graaff accelerator were amplified and applied to the target in proper phase to reduce time dependent variations in beam energy. The $Al^{27}(p, \gamma)Si^{28}$ resonance at 0.992-Mev is used to measure the beam energy spread. The measurements indicate that further improvements in the beam energy distribution are possible with optimum voltage and phasing of the signal applied to the target. (Author)

ORO-460 $1.10

Clevite Corp., Cleveland, Ohio.
FUEL-BEARING FIBERGLAS IN ALUMINUM BASE FUEL ELEMENTS. Seventh quarterly rept. 1 Apr-30 June 61 on Contract AT(40-1)-2557. July 61, 10p.

IDO-19029 $6.60

Combustion Engineering, Inc., Windsor, Conn.
ABWR. DESIGN AND DEVELOPMENT. Quarterly progress rept. 1 Jan-31 Mar 61, on Contract AT(10-1)-967. 15 May 61, 62p. CEND-129.

TID-12804 $5.60

Duquesne Light Co., Shippingport, Pa.
1D MAIN COOLANT PUMP (ALLIS-CHALMERS NO.80) INITIAL STARTING AND OPERATIONAL CHECKS, CORE 1, SEED 2. 17 Apr 61, 51p.

DLCS-3590401 $2.60

Duquesne Light Co., Shippingport, Pa.
1D REACTOR COOLANT PUMP STARTING CHARACTERISTICS, CORE I, SEED 2. 24 Apr 61, 28p.

DLCS-1500301 $2.60

Duquesne Light Co., Shippingport, Pa.
CALIBRATION AND INTERCOMPARISON OF CONTROL RODS, CORE 1, SEED 1, 5532 EFPH. 28 Oct 60, 26p.

TID-12786 $1.60

Duquesne Light Co., Shippingport, Pa.
CORE I CONTROL ROD DRIVE MECHANISM PERIODIC TEST, CORE I SEED 2. 17 Apr 61, 20p.

TID-12784 $1.10

Duquesne Light Co., Shippingport, Pa.
DETERMINATION OF TEMPERATURE COEFFICIENT AT 100% POWER, CORE I SEED 1. 20 Apr 61, 10p.

DLCS-3630101 $5.60

Duquesne Light Co., Shippingport, Pa.
DYNAMIC RESPONSE OF REACTOR PLANT TO LOAD SWINGS, CORE 1, SEED 2, EFPH 2263.7. 20 Apr 61, 60p.

TID-12785 $2.60

Duquesne Light Co., Shippingport, Pa.
FEDAL SYSTEM OPERATION DURING STATION START-UP, CORE I, SEED 2. 17 Mar 61, 24p.

TID-11696 $3.60

Duquesne Light Co., Shippingport, Pa.
MONTHLY OPERATING REPORT. Rept. on Contract AT-11-1-292. Aug 60, 38p.

TID-12882 $4.60

Duquesne Light Co., Shippingport, Pa.
MONTHLY OPERATING REPORT MARCH 1961. Rept. on Contract AT(11-1)-292. 50p.

TID-12710 $5.60

Duquesne Light Co., Shippingport, Pa.
MONTHLY OPERATING REPORT APRIL 1961. Rept. on Contract AT(11-1)-292. 53p.

DLCS-3360101 $1.60

Duquesne Light Co., Shippingport, Pa.
PERIODIC CALIBRATION OF PRESSURE INSTRUMENTATION, CORD I SEED 2. Apr 61, 14p.

DLCS-2110140 $1.60

Duquesne Light Co., Shippingport, Pa.
PERIODIC PRIMARY PLANT LEAK RATE TEST, CORE I SEED 2. June 61, 17p.

TID-13312 $1.60

Duquesne Light Co., Shippingport, Pa.
PERIODIC PRIMARY PLANT LEAK RATE TEST, CORE I, SEED 2. June 61, 17p. DLCS-2110137, 38 and 39.

DLCS-2110141 $1.60

Duquesne Light Co., Shippingport, Pa.
PERIODIC REACTOR PLANT LEAK RATE TEST, CORE I SEED 2. June 61, 15p.

DLCS-2250101 $11.00

Duquesne Light Co., Shippingport, Pa.
REACTIVITY LIFETIME: SECTION I: FIRST PERFORMANCE. 143p. July 61.

DLCS-2250102 $12.50

Duquesne Light Co., Shippingport, Pa.
REACTIVITY LIFETIME: SECTION I: SECOND PERFORMANCE. Mar 59, 172p.

DLCS-3610101 $1.60

Duquesne Light Co., Shippingport, Pa.
SHIPPINGPORT ATOMIC POWER STATION REACTOR PLANT COOLDOWN AND TEMPERATURE CONTROL SYSTEM. 28 Nov 60, 17p.

DLCS-3550201 $8.10

Duquesne Light Co., Shippingport, Pa.
STEAM GENERATOR TEST: 1A LOOP, FOSTER WHEELER STEAM GENERATOR, CORE I, SEED 2. 16 May 61, 81p.

DLCS-3550401 $3.60

Duquesne Light Co., Shippingport, Pa.
STEAM GENERATOR TEST (1A LOOP FOSTER-WHEELER STEAM GENERATOR), CORE I SEED 2. 17 Apr 61, 31p.

DLCS-3550101 $9.10

Duquesne Light Co., Shippingport, Pa.
STEAM GENERATOR TEST (1C LOOP, BABCOCK AND WILCOX STEAM GENERATOR), CORE 1, SEED 2. 21 Mar 61, 110p.

DLCS-2160105 $1.10

Duquesne Light Co., Shippingport, Pa.
VALVE OPERATING SYSTEM PERFORMANCE TEST, CORE I SEED 2, 14 Mar 61, 8p.

DLCS-1560103 $3.60

Duquesne Light Co., Shippingport, Pa.
XENON TRANSIENT 2790.5 EFPH, CORE I, SEED I 27 Apr 61, 31p.

GEAP-3389 $3.60

General Electric Co., San Jose, Calif.
STEAM SEPARATION PROGRAM. Final rept. Feb-Mar 60 on Contract AT(04-3)-189. 29p.

GEAP-3256 $9.10

General Electric Co., San Jose, Calif.
SUMMARY OF WORK PERFORMED ON A DISCONTINUOUS POSITION SERVO SYSTEM FOR THE LOCKING PISTON DRIVE, by N. J. Biglieri, G. B. Lloyd and others. Rept. on Contract AT(04-3)-189, PA#5, 105p.

GNEC-116 $13.50

General Nuclear Engineering Corp., Dunedin, Fla.
GAS-COOLED REACTOR PROJECT. Progress rept. no. 5. Oct 59, 196p.

GNEC-144 $1.75

General Nuclear Engineering Corp., Dunedin, Fla.
ZERO-FLOW SHUTDOWN COOLING TEST FOR BONUS-TYPE SUPERHEATER ELEMENTS. Rept. on Contract AT(11-1)-795. Nov 60, 70p.

HW-61543 $10.10

Hanford Atomic Products Operation, Richland, Wash.
DESIGN CRITERIA FOR PRTR HIGH PRESSURE LOOP, by J. C. Fox, M. T. Jakub, and W. S. Kelly. Oct 59, 108p.

HW-53004(Del.) $1.60

Hanford Atomic Products Operation, Richland, Wash.
AN EFFICIENT METHOD FOR RADIATION AND VENTILATION CONTROL OF CONTAMINATION ENCLOSURES: PROCESS TECHNOLOGY INFORMATION REPORT, by H. A. Moulthrop. Oct 57, 15p.

HW-SA-2143 $1.60

Hanford Atomic Products Operation, Richland, Wash.
GAS LUBRICATED BEARINGS IN A NUCLEAR APPLICATION, by E. C. Bennett. Mar 61, 14p.

HW-66539 $1.10

Hanford Atomic Products Operation, Richland, Wash.
GENERAL LIMITS FOR THE STORAGE OF ENRICHED URANIUM METAL, by R. E. Tiller. Aug 60, 7p.

HW-SA-2156 $2.60

Hanford Atomic Products Operation, Richland, Wash.
LIQUID WASTE MANAGEMENT PLANNING FOR THE PLUTONIUM RECYCLE TEST REACTOR, by W. A. Haney, G. E. Bachman, and D. R. Koberg. Rept. on Contract AT(45-1)-1350. Apr 61, 21p.

HW-66227 $1.60

Hanford Atomic Products Operation, Richland, Wash.
MODIFICATION STUDY - DR-1 LOOP. Interim rept. on Contract AT(45-1)-1350. 28 July 60, 13p.

HW-41884 $1.10

Hanford Atomic Products Operation, Richland, Wash.
PILE GRAPHITE CORE BORER, by J. M. Davidson. Mar 56, 7p.

HW-61900 C $8.10

Hanford Atomic Products Operation, Richland, Wash.
PLUTONIUM RECYCLE TEST REACTOR POWER TEST. Apr 61, 87p.

HW-70294 $1.10

Hanford Atomic Products Operation, Richland, Wash.
POSSIBLE EVIDENCE OF RADIATION-INDUCED SPLITTING OF GRAPHITE BARS. 11 July 61, 4p.

HW-70084 $1.60

Hanford Atomic Products Operation, Richland, Wash.
PROTOTYPE HOOD FOR DISSOLUTION OF PLUTONIUM METAL, AND FOR LEACHING OF INCINERATOR ASH, by L. E. Bruns and C. W. Nilsen. June 61, 7p.

HW-38210 $1.10

Hanford Atomic Products Operation, Richland, Wash.
REDOX PLANT SHUTDOWN REPORT - JUNE 13 TO JUNE 25, 1955, by R. T. Jessen. July 55, 5p.

HW-SA-1983 $3.60

Hanford Atomic Products Operation, Richland, Wash.
WASTE CONTROL AT THE HANFORD PLUTONIUM PRODUCTION PLANT, by R. F. Foster, R. L. Junkins, and C. E. Linderoth. Oct 60, 40p.

TID-12825

Kaiser Engineers, Oakland, Calif.
SPECIFICATION FOR EXPERIMENTAL GAS COOLED REACTOR. June 61, 16p.

LAMS-2539 $7.60

Los Alamos Scientific Lab., N. Mex.
KIWI-B SYSTEM DYNAMICS, by R. R. Mohler, O. A. Farmer and others. Rept. on Contract W-7405-eng-36. June 61, 81p.

LAMS-2541 $9.60

Los Alamos Scientific Lab., N. Mex.
2000 KILOWATT SODIUM TEST FACILITY, by L. A. Whinery. Rept. on Contract W-7504-eng-36. June 61, 118p.

TID-12564 $1.60

Los Alamos Scientific Lab., N. Mex.
NUCLEAR HEAT EXCHANGER ROCKETS, by Ralph S. Cooper. [1961] 18p. LADC-4781.

LAMS-2538 $2.60

Los Alamos Scienfitic Lab., N. Mex.
NUCLEAR ROCKET DYNAMICS AND CONTROL, by R. R. Mohler and E. A. Wheatley. Preliminary rept. on Contract W-7405-eng-36. June 61, 32p.

MND-P-3014-II $9.10

Martin Co., Baltimore, Md.
SNAP PROGRAMS. THERMIONIC ISOTOPIC POWER SYSTEMS. Quarterly progress rept. no. 6, 1 Jan-31 Mar 61, on Contract AT(30-3)-217. 99p.

ORO-463 $1.10

National Carbon Co., Fostoria, Ohio.
FUEL CYCLE DEVELOPMENT PROGRAM. Monthly newsletter May 61. Contract AT(40-1)-2560. 24 July 61, 6p.

NDA-2164-2 $8.10

Nuclear Development Corp. of America, White Plains, N. Y.
AN EVALUATION OF U^{233}-THORIUM FUELS FOR FAST BREEDER APPLICATION, by Ralph Hankel and Arthur J. Goldman. Rept. on Contract AT(30-1)-2303 (VIII). 15 Aug 61, 85p.

NMI-7201 $3.60

Nuclear Metals, Inc., Concord, Mass.
EVALUATION OF ZIRCALOY-2-CLAD UNALLOYED URANIUM TUBE NO. 72 MADE FOR IRRADIATION TESTING IN NRU, by W. J. Richmond. Rept. on Contract AT(30-1)-1565. Dec 60, 34p.

NMI-7237 $4.60

Nuclear Metals, Inc., Concord, Mass.
POWER REACTOR PROGRAM, by S. Isserow, A. M. White and others. Progress rept. 1-28 Feb 61, on Contract AT(30-1)-1565. Apr 61, 47p.

NMI-7239 $1.60

Nuclear Metals, Inc., Concord, Mass.
POWER REACTOR PROGRAM, by S. Isserow, R. W. Anderson and others. Progress rept. 1-30 Apr 61, on Contract AT(30-1)-1565. May 61, 18p.

CF-61-7-60 $1.10

Oak Ridge National Lab., Tenn.
AFTER SHUTDOWN COOLING REQUIREMENTS IN THE HFIR, by Neil Hilvety. July 61, 9p.

CF-61-6-83 $3.60

Oak Ridge National Lab., Tenn.
ECONOMICS OF THORIUM FUEL CYCLES, by P. R. Kasten, L. G. Alexander and others. June 61, 36p.

CF-61-6-93 $1.10

Oak Ridge National Lab., Tenn.
EFFECT OF ADDITION OF INOR-8 LINING INSIDE BAYONET FUEL TUBES ON PERFORMANCE OF THE MSBR, by L. G. Alexander. June 61, 3p.

CF-61-6-12 $1.60

Oak Ridge National Lab., Tenn.
THE EFFECT OF SIZE ON THE INVESTEMENT IN THE REACTOR PROPER OF AXIAL UPFLOW PEBBLE BED REACTORS, by R. B. Korsmeyer. June 61, 20p.

CF-61-8-29 $2.60

Oak Ridge National Lab., Tenn.
FABRICATION AND INSPECTION PROCEDURES FOR EXPERIMENTAL GAS-COOLED REACTOR BURST-SLUG-DETECTION TUBE AND THERMOCOUPLE PENETRATIONS, by G. M. Slaughter and T. R. Housley 14 Aug 61, 21p.

CF-61-7-85 $5.60

Oak Ridge National Lab., Tenn.
FUELING COST ESTIMATES FOR THE "BURN-UP AND DISCARD" FUEL CYCLE OF CANDU-TYPE NATURAL-URANIUM DIOXIDE HEAVY WATER POWER REACTORS, by R. Van Winkle. 19 July 61, 60p.

CF-61-7-54 $5.60

Oak Ridge National Lab., Tenn.
HRE-2 REPLACEMENT REACTOR STUDY NO. 2, by R. H. Chapman. 3 July 61, 56p.

CF-61-6-67 $3.60

Oak Ridge National Lab., Tenn.
AN IN-PILE LOOP FOR TESTING CERAMIC FUELS, by R. B. Korsmeyer. June 61, 37p.

CF-61-7-82 $2.60

Oak Ridge National Lab., Tenn.
MINUTES OF THIRD MEETING OF REACTOR DECONTAMINATION INFORMATION EXCHANGE GROUP AT ORNL, June 1-2, 1961, by A. B. Meservey. July 61, 29p.

CF-61-4-71 $2.60

Oak Ridge National Lab., Tenn.
PREPARATION AND SPECIFICATIONS OF MINIATURE FERMI REACTOR CORE B FUEL SPECIMENS FOR IRRADIATION TESTING, by J. H. Cherubini and R. C. Williams. Apr 61, 22p.

ORO-144(Del.) $17.50

Oak Ridge National Lab., Tenn.
A REPORT OF THE POWER REACTOR FUEL PROCESSING SYMPOSIUM HELD JULY 12-13, 1955 AT OAK RIDGE NATIONAL LABORATORY. Oct 55, 286p.

CF-61-6-58 $1.60

Oak Ridge National Lab., Tenn.
SHIELDING OF THE HFIR PRIMARY COOLANT DEAERATOR AND CONDENSERS, by H. A. McLain. June 61, 18p.

CF-61-8-37 $3.60

Oak Ridge National Lab., Tenn.
SOLUTION CRITICAL EXPERIMENTS FOR THE HIGH FLUX ISOTOPE REACTOR: PRELIMINARY CALCULATIONS, by H. C. Claiborne. 15 Aug 61, 36p.

CF-61-7-87 $1.60

Oak Ridge National Lab., Tenn.
XENON CHASE AND SAMARIUM BURNUP IN THE HFIR, by R. D. Cheverton. July 61, 14p.

NYO-9664 $2.60

Pennsylvania State U., University Park.
STRESSES AT NOZZLE CONNECTIONS OF PRESSURE VESSELS, by Donald E. Hardenbergh. Quarterly rept. 1 Apr-30 June 61, on Contract AT(30-1)-1874. 5 July 61, 22p.

RM-2696-AEC $2.60

Rand Corp., Santa Monica, Calif.
POWER RECOVERY FROM THE KILAUEA IKI LAVA POOL, by George C. Kennedy and David T. Griggs. Rept. on Contract AT(11-1)-135. Dec 60, 27p.

DP-567 $1.50

Savannah River Lab., Aiken, S. C.
THE HEAVY WATER SYSTEM OF THE PROCESS DEVELOPMENT PILE, by A. E. Dunklee. Rept. on Contract AT(07-2)-1. June 61, 68p.

DP-598 $0.50

Savannah River Lab., Aiken, S. C.
R-3/ADAM LATTICE BUCKLING MEASUREMENTS IN THE PROCESS DEVELOPMENT PILE, by W. E. Graves. Rept. on Contract AT(07-2)-1. July 61, 16p.

SRO-50 $1.60

Savannah River Operations Office, Ga.
HEAVY WATER POWER REACTOR PROGRAM. Monthly progress rept. June 61, 18p.

SRO-53 $1.60

Savannah River Operations Office, Ga.
HEAVY WATER POWER REACTOR PROGRAM. Monthly progress rept. July 61, 22p.

FZK-110(Suppl. 1) $10.50

Texas A. and M. Coll., College Station.
HAZARDS SUMMARY REPORT FOR THE NUCLEAR CENTER. 134p.

NDA-2131-40 $2.60

United Nuclear Corp., White Plains, N. Y.
PAWLING LATTICE TEST RIG - TEST REPORT NO. 1 - PLATR PCTR COMPARISON, by W. L. Brooks, M. R. Fleishman and others. Rept. on Contract AT(30-1)-2303(IX). June 61, 27p.

YAEC-136 $8.60

Westinghouse Electric Corp., Pittsburgh, Pa.
THE NUCLEAR DESIGN OF THE YANKEE CORE, by H. W. Graves, Jr., R. F. Janz and C. G. Poncelet. Rept. on Contract AT(30-3)-222. Feb 61, 91p.

WCAP-1433 $3.50

Westinghouse Electric Corp., Pittsburgh, Pa.
REACTIVITY AND NEUTRON FLUX STUDIES IN MULTIREGION LOADED CORES, by W. J. Eich and W. P. Kovacik. Rept. on Contract AT(30-1)-2176. June 61, 246p.

Nuclear Reactions

UCRL-6278-T(Rev.) $2.60

Lawrence Radiation Lab., U. of California, Livermore.
NUCLEAR MEASUREMENTS RELATED TO ASTROPHYSICAL PROCESSES, by W. A. S. Lamb. Mar 61, 16p.

TID-13344 $1.10

Notre Dame U., Ind.
INTERACTION OF PHOTONS AND PARTICLES WITH NUCLEI. Technical progress rept. on Contract AT(11-1)-427. 24 July 61, 10p.

CF-60-8-15 $4.60

Oak Ridge National Lab., Tenn.
ANALYSIS OF ORNL DATA ON THE RELEASE OF FISSION GASES FROM UO_2, by J. L. Scott. Sep 60, 43p.

TID-13189 $3.60

Purdue U., Lafayette, Ind.
ANGULAR DISTRIBUTIONS OF PROTONS FROM THE 19-MEV ALPHA PARTICLE BOMBARDMENT OF Na^{23}, Al^{27}, AND Si^{28}, by W. D. Ploughe, E. Bleuler, and D. J. Tendam. [1961] 33p.

TID-13490 $9.60

Purdue U., Lafayette, Ind.
MEASUREMENT OF L/K-CAPTURE RATIOS IN ELECTRON-CAPTURING NUCLIDES, by Augusto G. Santos Ocampo. Rept. on Contract AT(11-1)-694. Jan 61, 118p.

NYO-9744 $1.10

Rochester U., N. Y.
REMARK ON THE RADIATIVE MUON DECAY IN THE THEORY WITH AN INTERMEDIATE VECTOR MESON, by Z. Bialynicka-Birula. Rept. on Contract AT(30-1)-875. 5p.

TID-12875 $2.60

Wisconsin U., Madison.
DIFFERENTIAL CROSS SECTIONS FOR THE $T(p,n)He^3$ REACTION, by W. E. Wilson, R. L. Walter, and D. B. Fossan. 23p.

Radioactivity

PB 157 698 $6.60

Air Force Special Weapons Center, Kirtland AFB, N. Mex.
SCATTERED GAMMA RADIATION MEASUREMENTS FROM A LANTHANUM - 140 CONTAMINATED FIELD, by Clayton L. Schlemm and Alexander E. Anthony, Jr. June 59, 65p. 13 refs. AFSWC-TN-59-18; AD-235 320.

DESCRIPTORS: *Shelters, Lanthanum, *Radioactive isotopes, *Contamination; Concrete, *Radioactive fallout, Gamma rays, Radiation counters, *Underground structures, *Radiation damage, *Air raid shelters

A 90° sector of a circle of approximately 500-ft radius was contaminated with a Lanthanum-140 aqueous solution to an approximate level of 0.65 mc/sq. ft as a means of simulating an area approaching an infinite contaminated field. Radiation measurements were made in an open hole with a PDR-27A radiac instrument to determine the percentage of the total radiation which was due to scattered radiation (skyshine). This was found to be approximately 11.5%. These measurements were made at selected points from approximately 42 in. above to 24 in. below ground level. Data were obtained in a miniature basement to determine the attenuation of the skyshine by various thicknesses of concrete on the roof. (Author)

WT-811(Del) $8.60

California U., Los Angeles. School of Medicine.
DISTRIBUTION AND CHARACTERISTICS OF FALLOUT AT DISTANCES GREATER THAN 10 MILES FROM GOUND ZERO, by Charles T. Rainey, James W. Neel, and others. Rept. on Operation Nevada Proving Grounds, Feb 54, declassified 21 Mar 61. Upshot-Knothole, Mar-June 53, 93p.

DLCS-3330101 $3.60

Duquesne Light Co., Shippingport, Pa.
IB HEAT EXCHANGER LEAK TEST, CORE I, SEED 1. 3 Feb 61 and 24 Apr 61, 37p.

TID-12805 $1.10

Duquesne Light Co., Shippingport, Pa.
ACTIVATION AND TRANSPORT OF LONG LIVED CORROSION PRODUCTS, CORE I, SEED 2, EFPH 718.7 AND EFPH 2147.0, 24 Apr 61, 7p.

DLCS-2760201 $4.60

Duquesne Light Co., Shippingport, Pa.
CONTROLLED SAFETY TEST WITHDRAWAL TRANSIENTS (POWER RANGE), CORE 1, SEED 2, EFPH 2248. 20 Apr 61, 41p.

TID-12803 $3.60

Duquesne Light Co., Shippingport, Pa.
EXTERNAL RADIATION LEVELS OF REACTOR COOLANT LOOP PIPING AND COMPONENTS, CORE 1, SEED 2. 24 Apr 61, 36p.

DLCS-3250101 $1.60

Duquesne Light Co., Shippingport, Pa.
FUEL SHIPPING CONTAINER TEST, CORE I, SEED I, 24 Apr 61, 15p.

TID-12826 $1.60

Duquesne Light Co., Shippingport, Pa.
PERIODIC PRIMARY PLANT LEAK RATE TEST, CORE I, SEED I. 20 Apr 60, 13p.

DLCS-3200101 $1.10

Duquesne Light Co., Shippingport, Pa.
RADIATION SURVEY OF BEWI AND ASEWI, CORE I, SEED I. 24 Apr 61, 8p..

DLCS-3560105 $1.10

Duquesne Light Co., Shippingport, Pa.
REACTOR COOLANT FISSION PRODUCT ACTIVITY, CORE I, SEED 2, EFPH 8536.6. 25 Apr 61, 9p.

HW-69789 $2.60

Hanford Atomic Products Operation, Richland, Wash.
APPROXIMATE SHIELDING CALCULATIONS, by E. A. Coppinger. Rept. on Contract AT(45-1)-1350. May 61, 22p.

HW-SA-2171 $1.60

Hanford Atomic Products Operation, Richland, Wash.
COLUMBIA RIVER CONTINUOUS MONITORING SYSTEM, by T. C. Mehas. 12p.

HW-62453 $1.60

Hanford Atomic Products Operation, Richland, Wash.
CONTROLLED TEMPERATURE IRRADIATION OF GRAPHITE, by K. Koyama. Interim rept. no. 4, PT-IP-22A. Oct 59, 11p.

HW-68023 $5.60

Hanford Atomic Products Operation, Richland, Wash.
DEVELOPMENT OF GAMMA AND NEUTRON RADIATION DATA FOR THREE ALTERNATE DESIGN CONCEPTS FOR THE PLUTONIUM RECLAMATION FACILITY, PROJECT CAC-880, by H. A. Moulthrop. Jan 61, 57p.

HW-69533 $6.60

Hanford Atomic Products Operation, Richland, Wash.
FISSION PRODUCT RADIATION AND SHIELDING CALCULATIONS, by H. H. Van Tuyl. Rept. on Contract AT(45-1)-1350. May 61, 60p.

HW-66861 $1.10

Hanford Atomic Products Operation, Richland, Wash.
GAMMA SHIELDING CALCULATIONS FOR SLAG AND CRUCIBLE FRAGMENT HANDLING - PLUTONIUM RECLAMATION FACILITY, by H. A. Moulthrop. Sep 60, 10p.

HW-68116 $1.60

Hanford Atomic Products Operation, Richland, Wash.
RADIATION STABILITY OF SOME OF THE SOLIDS PROPOSED FOR STORAGE OF RADIOACTIVE WASTES, by G. B. Barton. Rept. on Contract AT(45-1)-1350. Feb 61, 14p.

HW-SA-2207 $1.60

Hanford Atomic Products Operation, Richland, Wash.
RESISTIVITY CHANGES IN ELECTRON IRRADIATED GRAPHITE, by I. T. Myers, H. V. Larson, and J. S. Loomis. Rept. on Contract AT(45-1)-1350. July 61, 17p.

HW-70706 $1.60

Hanford Atomic Products Operation, Richland, Wash.
SOME RADIOACTIVE MATERIALS MEASURED IN VARIOUS WATERS IN THE UNITED STATES: A LITERATURE SEARCH, by J. K. Soldat. Rept. on Contract AT(45-1)-1350. 15 Aug 61, 18p.

AD-257 178 $1.60

Massachusetts Inst. of Tech., Cambridge.
APPLICATION OF WEATHER RADAR TO FALLOUT PREDICTION, by Pauline M. Austin. Quarterly technical rept. no. 12, 1 Dec 60-28 Feb 61, on Contract DA 36-039-sc-75030. 15 Mar 61, 14p.

This report released by the cognizant military agency for sale to the public 26 Sep 61.

DESCRIPTORS: *Meteorological radar, *Radioactive fall-out, Atomic bomb explosions, Storms, *Meteorological data, Meteorology, Precipitation.

Investigation concerns the application of radar to the prediction of radioactive rainout resulting from a nuclear detonation. It is recognized that precipitation particles scavenge radioactive dust in the atmosphere so that fall-out patterns are altered by the occurrence of rain and snowstorms. Since the precipitation exhibits significant small-scale variability the rainout amounts at any particular points may differ considerably from the average value for the general area. Rainout computations for a 10 KT detonation in a selected wind field are nearly complete. Some of the results are summarized. (Author)

PB 158 290 $5.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
ATTENUATION OF GAMMA RADIATION THROUGH TWO-LEGGED RECTANGULAR DUCTS AND SHELTER ENTRANCEWAYS - AN ANALYTICAL APPROACH, by J. C. LeDoux and A. B. Chilton. 20 Jan 61, 55p. 11 refs. TN-383.

DESCRIPTORS: *Albedo, *Gamma rays, Attenuation, Ducts, *Shelters, Neutrons, *Shielding, Scattering, Neutron detectors.

An analytical approach is developed to permit determination of gamma radiation attenuation as it passes through two-legged rectangular ducts and shelter entranceways. The approach used employs the albedo concept for wall scattering and includes correction terms necessary to account for the "corner lip effect." With appropriate simplifying assumptions, moderately simple engineering formulas are obtained. Actual use of the formulas requires better knowledge of differential angular albedo than is presently available; however, by assuming isotropic distribution of the albedo function, a very good comparison of experimental information with results calculated by this technique is obtained. (Author) (See also AD-256 503)

PB 158 132 $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
EARLY TIME DECAY OF FISSION PRODUCT MIXTURES. I. SCINTILLATION COUNTER MEASUREMENTS FOLLOWING THERMAL NEUTRON FISSION OF U^{235}, by J. L. Mackin, P. E. Zigman and others. 10 Aug 59, 20p. 23 refs. Research and development technical rept. USNRDL-TR-359; AD-232 898.

DESCRIPTORS: *Fission products, Radioactive isotopes, Uranium, *Thermal neutrons, Gamma emission, *Scintillation counters, Van de Graaff generators, Photons, *Radioactive decay.

Photon decay rates of fission product mixtures from thermal neutron fission of U^{235} were measured for times after fission of one second to several hours with a well-type scintillation detector (counter). These data may be used as a reference base for decay measurements of fallout made with the same or similar instruments. The measured decay values were compared with recently reported experimental determinations of photon decay. This comparison permitted estimates of the numbers of photons (photon release rates) in the photon energy region below 0.3 Mev. (Author)

CF-61-6-85 $1.10

Oak Ridge National Lab., Tenn.
THE INFLUENCE OF RESIDENCE TIME DISTRIBUTION ON FISSION PRODUCT DECAY IN THE MSRE PUMP BOWL AND OFF-GAS LINE, by C. W. Nestor. 23 June 61, 6p.

TID-13197 $1.60

Purdue U., Lafayette, Ind.
THE DECAY OF In^{110m}, by W. G. Smith. [1959] 18p.

TID-13494 $3.60

Purdue U., Lafayette, Ind.
STUDIES OF THE NATURAL RADIOACTIVITY OF RHENIUM, by Henry Kocol. Rept. on Contract AT(11-1)-694. Jan 61, 34p.

TID-12884 $3.60

Robert A. Taft Sanitary Engineering Center, Public Health Service, Cincinnati, Ohio.
RATE OF RADIOACTIVE CONTAMINANTS IN WATER Rept. for 1 May 58-30 June 59 on Contract AT(49-5)-288. 17 July 61, 38p. SEC TR R60-2.

DP-589 $0.50

Savannah River Lab., Aiken, S. C.
METALLOGRAPHY OF U - 2 WT % Zr ALLOY BEFORE AND AFTER IRRADIATION, by C. L. Angerman and W. R. McDonell. Rept. on Contract AT(07-2)-1. July 61, 22p.

DLCS-2390401 $7.60

Duquesne Light Co., Shippingport, Pa.
PERIODIC WASTE DISPOSAL SYSTEM MATERIAL BALANCE TEST, CORE I SEED I. 14 June 61, 79p.

HW-59029 $1.60

Hanford Atomic Products Operation, Richland, Wash.
THE DECONTAMINATION OF REACTOR COOLING WATER WITH ALUMINUM, by W. B. Silker. Jan 59, 13p.

HW-SA-2053 $1.60

Hanford Atomic Products Operation, Richland, Wash.
THE INFLUENCE OF RADIOLOGICAL WASTES ON WATER QUALITY, by R. F. Foster. Rept. on Contract AT(45-1)-1350. Nov 60, 11p.

CF-61-7-3 $8.10

Oak Ridge National Lab., Tenn.
WASTE TREATMENT AND DISPOSAL, by R. E. Blanco and E. G. Struxness. Progress rept. Apr-May 61. Aug 61, 81p.

PERSONNEL SUPPLIES AND PERSONAL EQUIPMENT

PB 171 982 $2.25

Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson AFB, Ohio.
A HEAD CIRCUMFERENCE SIZING FOR HELMET DESIGN INCLUDING THREE-DIMENSIONAL PRESENTATIONS OF ANTHROPOMETRIC DATA, by Robert S. Zeigen, Edmund Churchill (Antioch Coll.) and others. Rept. on Biophysics in Flight, Contract AF 33(616)6792. Dec 60, 96p. 23 refs. WADD Technical rept. 60-631; AD-251 939.

DESCRIPTORS: *Anthropometry, *Helmets, Aviation personnel, Measurement, Design

A system for the sizing and design of rigid and semi-rigid helmets based on a single key dimension, head circumference, is described. Anthropometric data largely obtained in the 1950 survey of Air Force flying personnel were analyzed. This report includes an account of the historical development of sizing systems, programs, and resultant headforms in the Air Force; a detailed statement concerning the design rationale and statistical concepts used; comprehensive tables needed by the designer for all sizing programs discussed; a statement as to sculpturing techniques and problems; and a comment on preliminary validation results and on the over-all design-material-sizing concept. Appendices include a glossary of significant terms, descriptions of selected head and face dimensions, a detailed discussion of statistical concepts and formulae referred to in the report and tables of comparative Four and Six-Size Programs based on the key dimensions head length, head breadth. (Author)

PB 171 995 $0.50

Clark, David, Co., Inc., Worchester, Mass.
DEVELOPMENT OF AN EMERGENCY PRESSURE SUIT COVERALL, HIGH ALTITUDE, VENTILATION-EXPOSURE TYPE CSU-5/P. Final rept. for Feb 58-Nov 60 on Contract AF 33(600)36627. Nov 60, 17p. WADD Technical rept. 60-809; AD-254 906.

DESCRIPTORS: *Pressure suits, Ventilation, High altitude, Design, Exposure suits, Seals, Effectiveness

Developmental prototypes of emergency pressure suit, Type CSU-5/P, are described. Subsequent sizing of this coverall in the eight-size height-weight program was based on the fourth model. The development of this coverall presents an opportunity to consolidate the anti-exposure and altitude coveralls with a minimum penalty for weight, when used on a specific mission profile which requires protection at altitude, and exposure on land and water in cold climates. A review of the attempts to integrate the neck seal bladder and coverall, in conjunction with quick entry methods, indicate definite progress, but requires that modifications be considered. (Author)

PHYSICS

PB 155 112 $12.50

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
SOME CONSIDERATIONS ON SHELL THEORY, by K. Washizu. Rept. on Contract AF 19(604)7400. Oct 60, 176p. 17 refs. ASRL rept. no. 1001; Lincoln Lab. rept. no. 760-0002; AD-252 204.

DESCRIPTORS: *Structural shells, Theory, *Deformation, Elasticity, Plasticity, Stresses, Partial differential equations, Tensor analysis.

An attempt was made to establish a theory of shells in a unified way by the use of the principle of virtual work. The formulations can be applied to dynamic problems as well as to static problems, because inertial forces are included as body forces. Some preliminaries are mentioned. These include vectors and tensors, and deformation theories in rectangular Cartesian coordinates and in general curvilinear coordinates. In these theories the Lagrangian approach is used to describe the deformation. The deformation theory described is applied to shell problems, and can be applied to problems of the deformation theory of plasticity as well as to elastic problems. An incremental theory of thin shells is formulated. (Author)

ANL-6358 $4.60

Argonne National Lab., Ill.
PHYSICS DIVISION. Summary rept. Apr-May 61, on Contract W-31-109-eng-38. 50p.

ANL-6376 $6.60

Argonne National Lab., Ill.
PHYSICS DIVISION SUMMARY REPORT. Rept. on Contract W-31-109-eng-38. June 61, 84p.

BAW-1223 $1.60

Babcock and Wilcox Co., Lynchburg, Va.
U-238 RESONANCE INTEGRAL EXPERIMENT, by W. G. Pettus and C. Samuel. Interim rept. 1 Feb-30 June 61 on Contract AT(30-1)-2578. July 61, 15p.

PB 156 076 $1.60

California Inst. of Tech., Pasadena.
PRECISION MEASUREMENTS ON CERTAIN FUNDAMENTAL NATURAL CONSTANTS OF PHYSICS AND CHEMISTRY, by Harry A. Kilpatrick and Jesse W. M. DuMond. Final technical rept. on Contract DA 04-495-ORD-1117. 22 Mar 61, 11p. 7 refs. OOR rept. no. 1995:3; AD-253 993.

DESCRIPTORS: *X-ray spectrum, *Spectrographic analysis, Vacuum apparatus, Determination, *Instrumentation, Design, Physical properties, Chemical properties, X-ray spectroscopy, Optical equipment, Diffraction gratings, *X-ray spectrometers, Measurements

Attempts were made to redetermine with improved accuracy the conversion constant $\Lambda = \lambda_g/\lambda_s$ for converting wave-lengths from the Siegbahn nominal scale of x-ray wavelengths in x-units to the cgs scale in milliangstrom units, the voltage wavelength-conversion factor h sq c/(eΛ) expressed in x-units and the Faraday constant. The method chosen was that of photographing on the same spectrographic plate (a) x-ray spectral lines to be determined, and (b) Lyman-series lines from H-like atoms which have been stripped of their electrons in high-voltage sparks and whose wavelengths are accurately known. The instrument needed, a vacuum spectrograph of the Rowland type was designed and constructed with a ruled, concave grating, and with the slit mounted so as to give a very small angle of grazing incidence on the grating.

PB 156 077 $13.00

California U., Los Angeles.
ANALYSIS OF HIGH RESOLUTION ABSORPTION SPECTRA OF THE U^{+4} ION IN CRYSTALS, by S. A. Pollack. Technical rept. no. 2 on Contract DA 04-495-ORD-1375. Nov 60, 185p. 46 refs. OOR rept. no. 2099:4-P; AD-252 478.

DESCRIPTORS: Uranium compounds, *Crystals, Chlorides, Absorption, *Lattices, *Ions, *Spectrographic analysis, Electron transitions, Electric dipole transitions, Uranium.

Contents:
Theoretical discussion
The space group theory
Vibrations in crystals
Application of the group theory
Application of the theory to the analysis of molecular vibrations
Di (tetramethyl ammonium) uranium hexachloride
Di (tetraethyl ammonium) uranium hexachloride
Di (cesium) uranium hexachloride
Selection rules
Point group approximation
Space group approximation
Experimental results

Physical description of the spectra
Interpretation of spectra and discussion of experimental results
Absorption lines measured from photographic plates
Cs_2UCl_6
$(CH_3{\cdot}4N)_2UCl_6$
$(C_2H_5{\cdot}4N)_2UCl_6$

UCRL-13013 $2.60

Colorado School of Mines Research Foundation, Inc., Golden.
DIFFRACTION OF ELASTIC WAVES IN SOLIDS: A COLLECTION OF ABSTRACTS, by Jean-Pierre Fortin and John S. Rinehart. July 61, 24p.

APEX-650 $0.50

General Electric Co., Cincinnati, Ohio.
AIR FLOW TESTS OF A NARROW COLLECTOR PASSAGE WITH EIGHT TRANSVERSE FEEDER SLOTS, by R. W. Bell. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. Feb 61, 21p.

APEX-604 $0.75

General Electric Co., Cincinnati, Ohio.
CROSS SECTIONS FOR REACTOR ANALYSIS, by M. S. Ferry and J. W. Zwick. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. Apr 61, 33p. Supplement 3 to APEX-515.

APEX-634 $0.50

General Electric Co., Cincinnati, Ohio.
STRUCTURAL ANALYSIS OF THE ANP CONCENTRIC RING FUEL ELEMENT, by D. R. Riley. Rept. on Contracts AF 33(600)38062 and AT(11-1)-171. June 61, 20p.

PB 157 487 $1.60

Guggenheim Jet Propulsion Center, Calif. Inst. of Tech., Pasadena.
SEMI-EMPIRICAL FIT OF CO_2 EMISSIVITIES, by L. D. Gray. Technical rept. no. 34 on Contract Nonr-220(03). Oct 60, 11p. 7 refs. AD-246 098.

DESCRIPTORS: Carbon dioxide, Spectrographic analysis, *Gases, Statistical analysis, Carbon compounds, Dioxides

Measured data for carbon dioxide emissivities were correlated by postulating: (1) that the effective region widths, in which significant contributions are made to the total emission, increase with temperature and optical depth and (2) that unknown combination and harmonic bands make contributions to the integrated intensities of selected spectral regions in such a way that the absolute values of the integrated intensities remain invariant with temperature. (Author)

TID-12844 $6.60

Electrical Engineering Research Lab., Illinois U., Urbana.
RESEARCH AND INVESTIGATION LEADING TO METHODS OF GENERATING AND DETECTING RADIATION IN THE 100 TO 1000 MICRON WAVELENGTH RANGE OF THE SPECTRUM, by Basil Hakki. Final rept. on Contract AT(11-1)-392.

AD-260 024 repriced $2.60

Illinois U., Urbana.
INELASTIC DESIGN OF LOAD CARRYING MEMBERS. PART I. THEORETICAL AND EXPERIMENTAL ANALYSIS OF CIRCULAR CROSS-SECTION TORSION-TENSION MEMBERS MADE OF MATERIALS THAT CREEP, by S. Dharmarajan and O. M. Sidebottom. Rept. for 1 Nov 59-31 Oct 60 on Metallic Materials, Contract AF 33(616)5658. Jan 61, 73p. 32 refs. WADD Technical rept. 60-580, pt. 1.

DESCRIPTORS: Mechanics, *Cylindrical bodies, Deformation, Plasticity, Theory, Design, Stresses, Torque, Mathematical analysis, Materials, Creep, Nylon, Steel, Ethylenes, Polymers, Load distribution, Beams, Tests.

A new approach is presented to the problem of multiaxial creep. The theory is based on the usual assumptions namely, the directions of the principal stresses and strains coincide, the Hencky-Mises flow condition is valid, and the material is incompressible. It is proposed that load-deformation relations be derived for a specified time so that the theory is independent of time. For uniaxial state of stress the flow condition was assumed to be the isochronous stress-strain diagram obtained from constant stress, tension and compression creep curves. The torsion-tension member was chosen to represent the multiaxial states of stress. Sokolovsky's compressible solution was compared with a closed solution based on the assumption of incompressibility. Experimental data were obtained from nylon and polyethylene members tested in a controlled environment room and 17-7PH stainless steel members at 972F. Good agreement was found between theory and experiment. (Author)

UCRL-9747 $1.25

Lawrence Radiation Lab., U. of California, Berkeley.
NUCLEAR ORIENTATION OF SOME RARE-EARTH ISOTOPES, by Carolyn Ann Lovejoy. Rept. on Contract W-7405-eng-48. June 61, 52p.

UCRL-5157(Rev.) $3.60

Lawrence Radiation Lab., U. of California, Livermore.
THEORY OF ELECTROMAGNETIC FIELD FROM A HIGH-ALTITUDE SHOT, by James P. Wesley. Rept. on Contract W-7405-eng-48. Apr 61, 37p.

PB 156 240 $3.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
THEORETICAL CALCULATIONS ON SPIN-WAVE RESONANCE IN THIN FILMS, by Jerome I. Kaplan. Technical rept. Aug 60, 31p. 5 refs. LMSD-703087; AD-252 205.

DESCRIPTORS: Nuclear spins, Nuclear resonance, *Nuclear magnetic resonance, *Metal films, Ferromagnetic materials, Magnetic fields, Thin films.

Work on the theoretical aspects of ferromagnetic resonance in thin films is summarized. In particular, the absorption in the range of linear effects is calculated for the applied static magnetic field both prependicular to and parallel to the sample surface. In both calculations, line broadening due to the skin effect and natural line broadening (the same for all lines) are included. The absorption for a sample with a step function in the anisotropy field is calculated in an attempt to understand some experimental results. Finally, nonlinear effects are calculated for a nonlinear conducting film with the static field perpendicular to the surface. (Author)

PB 157 346 $3.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
DISTRIBUTION FUNCTION OF MAGNETICALLY CONFINED ELECTRONS IN A SCATTERING ATMOSPHERE, by W.M. Mac Donald (U. of Maryland) and M. Walt. Technical rept. on Contract Nonr-1797(00). Sep 60, 36p. 23 refs. LMSD-703 052; AD-243 370.

DESCRIPTORS: *Electrons, *Magnetic fields, Van Allen radiation belt, Terrestrial magnetism, Distribution, Atmosphere, Scattering.

A system of electrons confined in an inhomogeneous magnetic field in the presence of a nonuniform atmosphere of scattering particles is described at any instant by the distribution function appropriate to the situation in which no atmosphere is present. A generalization of the Fokker-Planck equation is then derived for the evolution in time of the distribution function through these quasi-equilibrium distributions. An approximate solution of this equation is given for the case of electrons trapped in the earth's magnetic field. This solution yields the distribution of the electrons in energy and angle as a function of time. (Author)

LAMS-2536 $1.60

Los Alamos Scientific Lab., N. Mex.
ARTIFICIAL AURORA AND UPPER ATMOSPHERIC SHOCK PRODUCED BY TEAK, by Herman Hoerlin. Rept. on Contract W-7405-eng-36. June 61, 18p.

LA-2527 $1.60

Los Alamos Scientific Lab., N. Mex.
HYDROGEN TRANSPORT PROPERTY CORRELATIONS, by J. D. Rogers, R. K. Zeigler, and Paul McWilliams. Rept. on Contract W-7405-eng-36. May 61, 19p.

MND-P-2352 $3.00

Martin Co., Baltimore, Md.
FINAL SAFETY ANALYSIS REPORT - SNAP 1A RADIOISOTOPE FUELED THERMOELECTRIC GENERATOR, by George P. Dix. Rept. on Contract AT(30-3)-217. June 60, 105p.

CF-61-6-66 $1.60

Oak Ridge National Lab., Tenn.
OBSERVATION OF IONIC SOUND WAVES IN GASEOUS DISCHARGE TUBES, by I. Alexeff and R. V. Neidigh. June 61, 14p.

NYO-2965 $12.00

Palmer Physical Lab., Princeton U., N. J.
MEASUREMENT OF THE NUCLEAR SPIN OF C^{11} BY THE ATOMIC BEAM METHOD, by Joseph L. Snider. Rept. on Contract AT(30-1)-937. July 61, 168p.

NYO-2963 $8.60

Palmer Physical Lab., Princeton U., N. J.
MEASUREMENTS OF THE SPINS OF Tm^{166} AND Tm^{167} AND THE HYPERFINE STRUCTURE OF Tm^{166} BY THE ATOMIC BEAM MAGNETIC RESONANCE METHOD, by James C. Walker. Rept. on Contract AT(30-1)-937. June 61, 74p.

PB 158 131 $4.60

Republic Aviation Corp. [Farmingdale, N. Y.]
STUDIES OF THE THEORY OF SPALLATION, by Walter F. Waldorf, Jr. Final rept. on Contract AF 29(601)1777. 12 May 60, 45p. 17 refs. Rept. no. MSD 217-950; AFSWC-TR-60-20.

DESCRIPTORS: *Spallation, Theory, Aluminum, Stresses, Wave propagation, Fracture (Mechanics), Plastic flow, Temperature.

The process of spallation and its separation into the two phenomena of stress-wave propagation in solid materials and fracture under dynamic loading are described. A brief account of the present state of knowledge concerning fracture, as well as the experimental data that form the basis of the theoretical development given and the fracture criterion that is to be used, is also given. A comprehensive theoretical derivation of Zhurkov's law of time-dependent fracture is presented. The results of this analysis and other factors entering into fracture processes are discussed. A brief account of some experimental methods that could be used to study spallation is given. (Author)

PB 156 058 $4.60

Stanford Research Inst., Menlo Park, Calif.
TABULATION OF ATOMIC AND MOLECULAR CHARGE-TRANSFER CROSS SECTIONS, by O. Heinz and E. J. Feinler. Interim technical rept. no. 1 on Contract DA 04-200-ORD-962. 20 Jan 61, 49p. 213 refs. SRI Proj. SU-2853; OOR Proj. C-4:1-P; AD-252 518.

DESCRIPTORS: Tables, *Bibliography, *Atoms, Molecules, Particles, *Ionization, Electron charge, Electron transitions

Experimental results pertaining to atomic and molecular charge-transfer processes reported in the literature from 1950 through 1960 were collected and tabulated on IBM punched cards. The parameters listed for each reaction are: the energy interval of the measurement, the maximum charge-transfer cross section, and the energy at which this maximum cross section occurs. Inasmuch as the Massey criterion still represents the best method for correlating existing data and for making at least rough predictions for other charge-transfer events, calculated values of the difference in binding energy between final and initial state of the electron are included. A bibliography of the charge-transfer literature, including both experimental and theoretical papers is presented. (Author)

WAPD-PWR-TE-83 $2.60

Westinghouse Electric Corp., Pittsburgh, Pa.
SHIPPINGPORT PWR-1 SEED 2 PHYSICS TEST RESULTS FROM 3600 EFPH TO 6200 EFPH, by G. H. Saito and J. H. Leonard. June 61, 26p.

Acoustics

PB 157 399 $1.60

California Inst. of Tech., Pasadena.
ON THE PROPAGATION OF SOUND IN A LIQUID CONTAINING GAS BUBBLES, by Din-Yu Hsieh and Milton S. Plesset. Rept. on Contract Nonr-220(28). Sep 60, 18p. 3 refs. Engineering Div. rept. no. 85-17; AD-245 604.

DESCRIPTORS: *Sound, Propagation, Theory, Heat transfer, Acoustics, Gases, Bubbles, *Thermodynamics, Liquids

A review is given of the theory of the propagation of sound in a homogeneous gas taking into account the effect of heat conduction. This consideration is preliminary to the treatment of the propagation of sound in a liquid with a homogeneous and isotropic distribution of gas bubbles. If f is the ratio of gas volume in the mixture to liquid volume, it is shown for the range of values of f of general interest that the acoustic condensations and rarefactions of the gaseous portion of the medium are essentially isothermal. It is also found that the attenuation of an acoustic disturbance by heat conduction is quite small. (Author)

PB 157 700 $2.60

Naval Ordnance Lab., White Oak, Md.
TABLES FOR THE SPEED OF SOUND IN DISTILLED WATER AND IN SEA WATER, by Wayne Wilson. 13 Nov 59, 24p. 12 refs. NAVORD rept. 6747; AD-234 983.

DESCRIPTORS: *Sound, Velocity, Sea water, Water, Tables, *Underwater sound.

The speed of sound in distilled water and sea water was measured as a function of pressure, temperature and salinity. Data is presented for the speed of sound in distilled water over the pressure and temperature ranges of 14.7 psia to 14,000 psia and 0.9°C to 91.2°C and in sea water over the pressure, temperature and salinity ranges of 14.7 psia to 14,000 psia, -3.0°C and 33.0°/oo to 37.0°/oo respectively. An ultrasonic pulse type apparatus using a fixed distance between the transmitting and receiving crystals was used to measure the sound speeds experimentally. Separate empirical formulas are given to express the sound speed in distilled water as a function of temperature and pressure and in sea water as a function of temperature, pressure, and salinity. Tables of sound speed were prepared from these formulas and are presented. The standard deviation from the mean of the difference between the measured data and the data computed for distilled water was 0.17 m/sec. In sea water, the standard deviation from the mean of these differences was 0.22 m/sec. (Author)

PB 157 715 $3.60

Naval Ordnance Lab., White Oak, Md.
ULTRASONIC MEASUREMENT OF THE VELOCITY OF SOUND IN DISTILLED AND SEA WATER, by W. D. Wilson. Apr 60, 34p. 16 refs. NAVORD rept. 6746; AD-235 652.

DESCRIPTORS: *Sound, Sound ranging, *Underwater sound, *Underwater sound equipment, *Underwater sound signals, Velocity, Measurement, *Ultrasonics, Instrumentation, Design, Water, Sea water.

An instrument was designed and constructed for the measurement of sound speed in liquids as a function of temperature and pressure. This instrument utilizes the ultrasonic pulse technique to determine the time required for a pulse to traverse the distance between two crystal transducers fixed at each end of a cylinder containing the test liquid. A description of the instrument and the accessory equipment required for its use is given. The results obtained in distilled water and in sea water are tabulated and compared with the results obtained in other investigations. It is estimated that the precision of the measurements in water is 1 part in 7,500. (Author)

PB 171 990 $0.75

North Carolina State Coll., Raleigh.
VELOCITY OF SOUND MEASUREMENTS IN HIGH PRESSURE, HIGH TEMPERATURE STEAM, by James Woodburn. Technical rept. no. 2 on Contract Nonr-486(05). Nov 60, 26p. AD-250 302.

DESCRIPTORS: *Steam, *Sound, Transmission, Temperature, Pressure, Acoustics, High temperature research, High pressure research, Laboratory equipment, Gases, Vapors, *Interferometers

A variable path type acoustic interferometer was designed to operate at combined high pressure and temperatures using steam as a medium. The experimental values concerned with the velocity of sound in steam are to be compared with the calculated values from the tables of Keenan and Keyes. The interferometer apparatus for these experiments was of stainless steel, 6 in. in diam., with high pressure, high temperature steam connections at the lower side. Two electrodes mounted in the interferometer cap were connected with a thermocouple and one with a crystal sound source. The experimental procedure was to start at 1000 psig and 750 F, and decrease the boiler pressure to 800,

600, 400 and 200 psig, leaving the superheater controls alone. With 5 complete runs, velocity of sound measurements were made at 5 different temperatures with the respective pressures between 1000 to 200 psig. The sound reaction peaks were quite distinct over the entire range of experiments; 25 peaks were easily detected. Further studies concerning absorption and dispersion are planned as well as sound velocity measurements up to 2000 psig and 750 degrees F.

Electricity and Magnetism

AD-259 714 repriced $2.00

Energy Conversion Lab., Mass. Inst. of Tech., Cambridge.
THEORETICAL AND EXPERIMENTAL RESEARCH ON THERMOELECTRICITY. Scientific rept. no. 4 on Contract AF 19(604)4153. 15 Jan 61, 79p. 57 refs. AFCRL-122.

DESCRIPTORS: *Semiconductors, *Thermoelectricity, Thermal conductivity, Materials, High temperature research, Intermetallic compounds, Molybdenum alloys, Tellurium alloys, Bismuth alloys, Antimony alloys, Selenium alloys, Cadmium alloys, Mercury alloys, Mathematical analysis, Diodes.

This study covers research during the past year on the preparation and evaluation of compound semiconductors, on criteria for the selection of thermoelectric materials, the development of high temperature measuring apparatus, and studies of different mechanisms of thermal conduction. Crystals of the semiconductor alloy $Bi_{24}Se_6Sb_{60+x}Te_{150-x}$ have been prepared and the Seebeck coefficient α, electrical resistivity and thermal conductivity k, have been measured at room temperature. Specimens of the alloy system Mo-Te have been prepared and the crystal structure of the ditelluride determined. Some specimens of Lead Telluride have been prepared for the investigation of the anamolous temperature dependence of thermal conductivity in that material. Criteria for the determination of optimum impurity doping in thermoelectric materials are derived and discussed for the two cases of optimum constant impurity doping and optimum variable impurity doping. A high temperature thermal conductivity apparatus is described and measurements of k and α of Bismuth Telluride in the range 300°K to 550°K are presented. A room temperature impulse measurement of the thermal diffusivity of semiconductors is described. Small signal characteristics of thermoelectric heat pumps are briefly discussed and the design of an Esaki diode oscillator is presented. (Also included in AD-255 694)

PB 155 043 $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
AN AUDIO-FREQUENCY HYSTERESIGRAPH FOR THIN MAGNETIC FILMS, by Daniel D. Strassberg. Rept. on Contract AF 19(604)5200. 16 Oct 59, reissued 1 Mar 61, 16p. 1 ref. Group rept. 51-10; AD-252 046.

DESCRIPTORS: *Thin films, Ferromagnetic materials, *Ferromagnetism, *Hysteresis, Measurement, *Instrumentation, Design, Circular coils, Audiofrequency, Electronic equipment, Oscillographs, Oscilloscopes, Films.

An audiofrequency (1000 c) hysteresigraph, or looper, was designed with the ability to perform a large number of tests and to accept specimens in a wide range of sizes. A block diagram is given of the instrumentation of the looper. The output of the pickup circuit is amplified, integrated, and applied to the vertical signal circuit of an oscilloscope. A voltage proportional to the current in the driving field coils is developed across a current measuring resistor. This voltage is applied to the horizontal signal circuit of the scope. Some of the problems encountered include pickup of 60-c stray fields, limited frequency response, resonance in the pickup circuit, and inability to obtain perfect cancellation of the voltages induced in the pickup and bucking coils. In addition, noise and nonlinearities in the preamplifier between the pickup circuit and the oscilloscope presented trouble.

Electronics

PB 150 978 $8.10

Case Inst. of Tech., Cleveland, Ohio.
COMMUNICATION IN THE PRESENCE OF AN INTELLIGENT NOISE SOURCE. Final rept. June 58-Oct 59, on Contract AF 39(602)1847. Oct 59, 90p. 3 refs. RADC Rept. no. TR-59-176; AD-228 482.

DESCRIPTORS: *Radio antijamming, *Noise (Radio) Radio equipment, Simulation, Costs, Model tests, Radio communication systems, Switching circuits, Radio transmission, Frequency measurement, Radio interference.

The situation characterized by communication in the presence of jamming has been considered in two ways: (1) when the communicator tries to avoid the jammer by switching transmissions from one channel to another, under the assumption that jamming results in complete loss of message and (2) when the communicator confuses the jammer by transmitting on several channels simultaneously. This results in loss of power and gain in chances of dodging the jammer. In this case the effect of relative power on the destructive effects of jamming was considered. Efforts were made to devise methods for communicating more effectively in view of the fact that probability of jamming increases with time. Attempts were to set up a model which discusses a p. c. m. communication system in terms of the relative importance of the different parameters of the system to the overall cost to the system. An equipment simulating a jamming and communication system has been set up and some gaming has been carried out. (See also PB 146 199)

PB 155 036 $4.60

Electronics Research Lab., U. of California, Berkeley.
SYNTHESIS OF ACTIVE DRIVING-POINT IMMITTANCE FUNCTIONS, by S. K. Mitra and E. S. Kuh. Rept. on National Science Foundation Contract G-12142. 27 Dec 60, 47p. 12 refs. IER series no. 60, issue no. 339.

DESCRIPTORS: Synthesis, Polynomials, Functions, Feedback amplifiers, Resistors, Capacitors, *Electrical networks, Feedback oscillators, *Mathematical analysis, Resistors, Capacitors.

Three main methods of synthesis are discussed. All of them realize immittance function by active RC networks such that the realized network has minimum immittance pole sensitivity. Because of the elegant decomposition and partitioning techniques, the methods of synthesis are more straightforward and result in a semi-unique network (unique in the sense that the decomposition of the denominator polynomial of the immittance function is unique). Another feature of the methods is that the realized network is transformerless. The cascade method is easy to understand, though the feedback method, as it uses a practical amplifier, is a more practical method than the other two methods. The main problem associated with the cascade and the feedback method is obtaining a rational z_{12} (or y_{12}). This problem does not arise in the method of synthesis using special structures, which though simpler, always results in a network having a larger number of resistors and capacitors. The method of driving-point immittance synthesis could be extended to the synthesis of transfer functions by the usual methods. (Author)

AD-258 264 $3.60

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
RESEARCH ON PARAMAGNETIC RESONANCES, by R. L. Kyhl and M. W. P. Strandberg. Quarterly progress rept. no. 2, 15 Dec 60-15 Mar 61, on Contract DA 36-039-sc-87376. [1961] 40p. 8 refs.

This report released by the cognizant military agency for sale to the public 26 Sep 61.

DESCRIPTORS: *Paramagnetic resonance, *Microwave amplifiers, Amplifiers, Electron tubes, Nuclear spins, Lattices, Relaxation time, Electron transitions, *Microwave spectroscopy, Phonons, Microwaves, Crystal detectors, Crystal rectifiers, Cavity resonators, Design, Molecular beams, Ruby.

Research was continued to obtain and investigate amplification by inverting the population of a paramagnetic mechanical system. Some properties of spin-lattice relaxation constants are described. Limitations of electron magnetic-resonance detector sensitivity and quantitative spin determination are discussed. The observation of crossover transitions is reported. (Author)

AD-257 197 $2.60

Tung-Sol Electric, Inc., Bloomfield, N. J.
RESEARCH AND DEVELOPMENT IN UTILIZATION OF SELF-SUSTAINED ELECTRON EMISSION INVESTIGATION, by B. G. Firth, Warren C. Johnson, and Donald W. Mayer. Quarterly rept. no. 5, 4 Jan-3 Apr 61, on Contract DA 36-039-sc-85120. [1961] 26p. 2 refs.

This report released by the Cognizant Military Agency for sale to the public 26 Sep 61.

DESCRIPTORS: *Cathodes (Electron tubes), *Cold cathode tubes, Electron tubes, *Oxide cathodes, Coatings, Magnesium compounds, Oxides, Secondary emission, Thin films, Field emission, Thermionic emission, Sprays, Electrostatics, Test equipment, Tests, Single crystals.

Secondary emission properties of MgO cold cathodes were found to be useful indicators in the development of thin film coatings to sustain electron emission. Secondary emission analyzer tubes were developed for this purpose. The secondary to primary emission ratio (delta) must be sufficiently high to sustain electron emission. Optimum coating thickness for a given porosity and/or density is another factor. A one micron thick coating was made to sustain 5.2 ma/sq cm emission. Development of spray coating formulas is described. Gas sorption experiments prove that measurable amounts of oxygen are adsorbed by the MgO during heating in air at reduced pressure on regular processing. Variations in the amounts of oxygen adsorbed by different coatings of the same weight indicate differences in the surface area of the MgO. This is changed quite considerably by the method of coating material preparation and cathode processing. Sorption of gas is necessary to obtain self-sustained emission. (Author)

Molecular Physics and Spectroscopy

ORO-464 $1.60

Georgia U., Athens.
INFRARED SPECTRA OF PLASTICS AND ELASTOMERS AFTER NUCLEAR IRRADIATION, by W. C. Sears. Progress rept. on Contract AT(40-1)-2418. 13p.

HW-SA-2209 $1.60

Hanford Atomic Products Operation, Richland, Wash.
FUSED SALT SPECTROPHOTOMETRY III: URANIUM IV IN FUSED-CHLORIDE MELTS, by John R. Morrey. Rept. on Contract AT(45-1)-1350.

PB 156 075 $1.10

Iowa State U., Iowa City.
THE STRUCTURE OF OLEFIN-METAL COMPLEXES, by Norman C. Baenziger and J. R. Doyle. Final rept. 20 Jan 58-1 Feb 61, on Contract DA 11-022-ORD-2647. [1961] 9p. OOR rept. no. 1952:5; AD-254 703.

DESCRIPTORS: *Polycyclic compounds, *Metalorganic compounds, *Complex compounds, *Molecular structure, Physical properties, Silver compounds, Salts, Copper compounds, Platinum compounds, Mercury compounds, Palladium compounds, Nickel compounds, *Crystal structure, X-ray diffraction analysis, Ferrocenes, Cyclooctatetraene, *Ethylenes, Styrenes

Contents:
Preparative studies
Complexes containing bicycloheptadiene (norbornadiene)
Olefin-silver complexes
Olefin-copper complexes
Olefin-platinum complexes
Olefin-mercury compounds
Olefin-nickel complexes
Diffraction studies
Bicycloheptadiene-bis-silver nitrate
Tetramethyl-mu-cyclooctatetraene-diplatinum
1, 2-Diferrocenylethane, $C_{22}H_{22}Fe_2$
1, 5-Cyclooctadiene-cuprous chloride
Dicyclopentadiene-cuprous chloride, $C_{10}H_{12}CuCl$
bicycloheptadiene-cuprous chloride, C_7H_8CuCl
dipentene-platinous chloride, $C_{10}H_{16}PtC_{12}$

Dicyclopentadiene-platinous chloride
Styrene-palladous chloride dimer $(C_8H_8PdC_{12})_2$
Norbornadiene-palladous chloride, $C_7H_8PdC_{12}$

PB 156 074 $1.60

Iowa State U., Iowa City.
THE STRUCTURE OF OLEFIN-METAL COMPLEXES, by N. C. Baenziger, C. L. Carpenter (Arizona State U.) and others. Technical rept. no. 3 on Contract DA 11-022-ORD-2647. 1 Apr 61, 12p. 13 refs. OOR rept. no. 1952:4; AD-254 594.

DESCRIPTORS: *Ethylenes, *Metallic compounds, *Complex compounds, *Crystal structure, *Molecular structure, Styrenes, Palladium compounds, Chlorides, Camphanes, Polycyclic compounds, Single crystals, Platinum compounds, Chemical bonds, Infrared spectroscopy, Raman spectroscopy, *Metalorganic compounds, Least squares method

Further refinements of the structures of (styrene-$PdCl_2)_2$ and norbornadiene-dichloropalladium II have been carried out. A least-squares refinement of the $(styrene\text{-}PdCl_2)_2$ structure was made using the previously observed data. New intensity data obtained with a proportional counter was used for the norbornadiene-$PdCl_2$ structure. In both instances the new distances found are more nearly the normal distances. The structure of dicyclopentadiene-$PtCl_2$ has been determined from single crystal studies. Both double bonds of the dicyclopentadiene molecule are coordinated to the platinum atom. (Author)

PB 156 070 $1.10

Kentucky Research Foundation, Lexington.
THE EFFECT OF RING SIZE ON THE SPECTRA OF SOME CYCLOALKANO(a)PYRROLES, by John M. Patterson, Jay Brasch, and Peter Drenchko. Interim technical rept. no. 1, Feb 57-Mar 61, on The Pyrolysis of Some Cycloalkano(a)Pyrroles, Contract DA 33-008-ORD-1491. [1961] 9p. 15 refs. OOR rept. no. 1773:1; AD-254 929.

DESCRIPTORS: *Pyrroles, *Pyrolysis, Ketones, *Heterocyclic compounds, Synthesis, Methanes, *Ultraviolet spectroscopy, *Infrared spectroscopy, *Molecular structure, Carbonyl radicals, Absorption, *Polycyclic compounds.

Some ketocycloalkano(a)pyrroles have been synthesized and their ultraviolet and infrared spectra measured. The effect of ring size of the cycloalkano-ring on the spectra has been noted and interpreted in terms of steric strain. Only the primary band is observed; the secondary band is either masked completely or appears as a poorly defined shoulder of the primary band. The carbonyl frequencies of the ketocycloalkano(a)pyrroles decreased with increasing size of the cycloalkano ring system. (Author)

AD-259 326 repriced $0.75

National Bureau of Standards, Washington, D. C.
STANDARDIZATION OF THERMAL EMITTANCE MEASUREMENTS, by William N. Harrison, Joseph C. Richmond and others. Rept. for 1 July 59-30 June 60, on Materials Analysis and Evaluation Techniques, Contract AF 33(616)58-20. Feb 61, 21p. WADC TR-59-510, pt. 2.

DESCRIPTORS: *Thermal radiation, *Blackbody radiation, Infrared spectroscopy, *Monochromatic light, Measurement, Materials, Standardization, Mathematical analysis, Digital recording systems, Optical spectrometers, Data processing systems.

Work was directed toward establishment of equipment and procedures for the evaluation of normal spectral emittance of specimens held at temperatures in the range of approximately 800 to 1400 K (980 to 2060 F), over the wavelength range of 1 to 15 microns. Some of the developments were modified to increase precision and reduce errors in the measurements. One such modification was to provide means whereby a reference blackbody furnace and the hot specimen could be interchanged at will as sources of radiant flux to be measured relative to that from the comparison blackbody furnace. The apparent emittance of the specimen and of the reference blackbody furnace were both measured relative to the comparison blackbody furnace. The apparent emittance of the specimen at each of numerous selected wavelengths was then divided by the corresponding apparent emittance of the reference blackbody furnace to obtain the reported spectral emittance of the specimen. Assembly of the equipment for determination of spectral reflectance, under conditions approximating normal illumination and hemispherical viewing, was completed. (Author)

PB 156 861 $8.10

Ohio State U. Research Foundation, Columbus.
NUCLEAR MAGNETIC RESONANCE SPECTRA OF SOME AMINO ACIDS, by Leland Dwight Farringer, L. Carlton Brown, and Dudley Williams. Technical rept. 1 on Contract Nonr-495(10). Aug 60, 84p. 57 refs. RF Proj. 656; AD-245 908.

DESCRIPTORS: *Amino acids, *Nuclear magnetic resonance, Spectrographic analysis, Protons, Spin, Nuclear spins, Lattices, Hyperfine structure, Glycines; Alanines, Cysteine; Arginine, Lysines, Serine, Methionine, Leucine.

While the low solubility of many of the amino acids in water makes the recording of spectra difficult in many cases, it has been possible to obtain some results which show reasonable correlation with known chemical structures. The close groupings of the NH_3 resonances of all of the materials studied and their similar concentration dependence indicates the strong influence of the solvent on this resonance. The behavior of the NH_3 resonance may be a useful indicator of conditions such as the concentration of this class of materials in aqueous solutions. The extent to which spectra of these materials in H_2O solutions would agree with the spectra of the D_2O solutions is not known. Data recently received on nuclear magnetic resonance studies of amino acids dissolved in trifluoroacetic acid, with tetramethylsilane as an internal reference, show some qualitative similarity to some of the spectra studied in the present experiments. However, the chemical shifts reported when converted to H_2O reference, are quite different from those measured in either the D_2O or the H_2SO_4 solutions, (Author)

PB 157 496 $2.60

Statistical Techniques Research Group, Princeton U., N. J.
SPECTRAL ANALYSIS COMBINING A BARTLETT WINDOW WITH AN ASSOCIATED INNER WINDOW, by Thomas H. Wonnacott. Technical rept. 40 on Contract DA 36-034-ORD-2297. Feb 61, 23p. 6 refs. OOR rept. no. 1715:37, AD-253 439.

DESCRIPTORS: *Spectrographic analysis, Statistical analysis, Probability, Errors, Statistical processes, Series

Usual methods of spectrum estimation allow very strong frequencies to affect the spectrum estimates at distant frequencies because the weighting function (spectrum window) cannot be made identically zero over the rejected range of frequencies. To give bounds for this error, a pair of windows, one with positive side lobes (Bartlett), the other with negative side lobes (modified Bartlett), are used simultaneously. Thus we demonstrated the error reduction achieved by detrending and prewhitening an example economic time series. The details of the spectrum windows, and a discussion of confidence limits for the spectrum, are given in the appendix. (Author)

Optics

PB 158 314 $1.10

Ballistic Research Labs., Aberdeen Proving Ground, Md.
TERRESTRIAL REFRACTION OF LIGHT, by E. J. McShane. 18 Aug 42, 7p. BRL rept. no. 302.

DESCRIPTORS: *Light, Refraction, *Atmospheric refraction, Determination, Optics.

A formula is developed for computing the effects of atmospheric refraction in bending the light-rays from an object to an observer, both in the atmosphere. A short table is appended for calculating the amount of refraction. (Author)

PB 157 488 $1.60

Guggenheim Jet Propulsion Center, Calif. Inst. of Tech., Pasadena.
MEAN BEAM LENGTH CALCULATIONS FOR RADIATION FROM NON-TRANSPARENT GASES, by D. B. Olfe. Technical rept. no. 35 on Contract Nonr-220(03). Oct 60, 15p. 4 refs. AD-246 097.

DESCRIPTORS: *Gases, Energy, *Thermal radiation, Spectrographic analysis, Transmission, Optics.

Mean beam lengths are studied for the following types of band structure (1) bands composed of non-overlapping collision-broadened lines: (2) bands which may be approximated by constant average absorption coefficients acting over effective band widths, and (3) bands composed of randomly distributed, collision-broadened lines. The temperature and pressure dependence of the mean beam length is studied for these types of band structure and expressions for the mean beam length are obtained for some simple enclosure geometries. (Author)

PB 153 436 $3.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
LABORATORY PROPAGATION AND MEASUREMENT OF VISIBLE AND NEAR-INFRARED RADIATION. AN ANNOTATED BIBLIOGRAPHY, by A. A. Beltran. 13 June 60, 31p. 62 refs. Special Bibliography SRB-60-2; SB-60-21; AD-241 587.

DESCRIPTORS: *Infrared radiation, Propagation, Measurement, Intensity, Temperature, *Bibliography, Sources, Instrumentation, *Light, Electromagnetic waves, Solar energy.

The laboratory testing of solar energy devices requires a light source operating in the region from 4,000 to 13,000 A (0.4 to 1.3 microns) at 2800°K (±20°K). This bibliography is concerned with: (1) sources of radiation within these wavelengths, and (2) methods and instrumentation for the measurement of color temperature intensity, magnitude, and uniformity of radiation. (Author)

PB 158 323 $1.60

Navy Electronics Lab., San Diego, Calif.
POLARIZED-LIGHT ILLUMINATION OF RADAR AND SONAR SPACES AND COMPARISON WITH LIMITED SPECTRUM METHODS, by C. T. White. 21 Feb 56, 14p. 5 refs. NEL rept. 669; AD-109 046.

DESCRIPTORS: *Combat information centers, Illumination, *Light, Polarization.

A localized lighting technique, utilizing polarized light, was developed for use in radar and sonar spaces. The technique was compared with other available lighting techniques and shown to have a number of advantages. It is recommended that the technique be evaluated in operational units. (Author)

TID-13047 $2.60

Notre Dame U., Ind.
FUNDAMENTAL RESEARCH IN PHOTOEMISSION. Rept. on Contract AT(11-1)-274. June 61, 18p.

Solid State Physics

AD-256 690 repriced $1.25

CBS Labs., Stamford, Conn.
STUDY OF MICROJUNCTION FORMATION TECHNOLOGY, by A. Ramsa and R. Engelmann. Quarterly progress rept. no. 3, Dec 60-Feb 61, on Contract DA 36-039-sc-85337. 31 Mar 61, 45p. Rept. no. CLD 1392.

DESCRIPTORS: *Semiconductors, Processing, Impurities, Silicon, Surfaces, *Electron beams, Ion beams, Electron bombardment, Ion bombardment, *Diodes, Gold wire, Nickel, Welding, Tin alloys, Silver alloys, Metal films, Aluminum compounds, Electrical properties, Temperature, Packaging, Physical properties, Subminiature electronic equipment.

The theory of the dependence of processing temperature on sample geometry is formulated. Results of electron-beam welding gold and nickel wires to silicon, and experiments on electron-beam alloying of tin and silver into silicon are reported. The successful fabrication of aluminum-silicon P-N junction diodes by electron-beam processing is described, giving optimum electron-beam current and voltage and showing the electrical characteristics of completed mesa diodes. (Author)

AD-256 629 $2.60

Clevite Corp., Cleveland, Ohio.
STUDY OF METHODS FOR IMPROVING QUALITY OF SYNTHETIC QUARTZ, by D. R. Hale and A. E. Carlson. Quarterly technical rept. no. 2, 16 Jan-15 Apr 61, on Contract DA 36-039-sc-87372. 21 Apr 61, 26p. 4 refs.

This report released by the cognizant military agency for sale to the public 26 Sep 61.

DESCRIPTORS: *Quartz crystals, *Quartz resonators, Growth, Production, Crystals, Materials, Tests, X rays, Test equipment, Quality control, Physical properties.

Eight hydrothermal growing experiments are in operation, of which five are expected to yield crystals large enough for making 1 mc fundamental resonator blanks. Experiments were made on a short time basis to investigate growth conditions such as: (1) use of potassium alkali solution, (2) vitreous silica feed, (3) silica gel feed, (4) baffle in 20-inch autoclave, and (5) plastic linings for ultra-purity conditions at low temperature. As a result of test experiments it is believed that silica gel and vitreous silica can be used as feed just as ordinary quartz. Growth in KOH solutions tended to yield quartz containing hairlike channels, believed to be liquid-vapor inclusions, extending parallel to the Z-axis often less than 1 mm long. In order to obtain specimens whose dislocation content is known, the X-ray techniques of Lang and of Borrmann were initiated. (Author)

PB 156 079 $1.60

Cornell U., Ithaca, N. Y.
STRUCTURE ANALYSIS OF COMPLEX COMPOUNDS WITH EMPHASIS ON EIGHT-COORDINATION TYPES, by J. L. Hoard. Final rept. 1 Feb 59-31 Jan 61, on Contract DA 30-069-ORD-2526. [1961] 18p. 13 refs. OOR rept. no. 2254:1; AD-253 664.

DESCRIPTORS: *Complex compounds, Crystals, Single crystals, Metallic crystals, Amines, Crystal structure, *Metalorganic compounds, *Complex ions, Zirconium compounds, Cyanides, Hafnium compounds, Potassium compounds, Molybdenum compounds, Iron compounds, Rubidium compounds, *Chelate compounds, Sodium compounds, Acetyl radicals, Ethylenes Molecular structure, Chemical bonds, Data processing systems, X-ray diffraction analysis.

X-ray diffraction studies begun under this contract are utilizing spectrometrically-measured (MoKα) three-dimensional intensity data from single crystals. An efficient procedure employing the convergent beam technique for counter measurement of the several thousands of (hkl) intensities given by one of the typical crystals, and the development (for the Burroughs 220) of computational programs to handle these data are described. Nearly complete hkl intensity measurements have been obtained, for the following substances: (1) zirconium (IV) acetylacetonate (C-II): (2) tetrakis-oxalato complexes of Zr(IV) and Hf(IV) (C-III); (3) classic $K_4 Mo(CN)_8 \cdot 2H_2O$ structure (C-IV); and (4) EDTA complex of ferric iron (C-V and C-VI). The significance of the zirconium acetylacetonate and other studies of discrete eight-coordination complexes is discussed. (Author)

PB 155 370 $2.60

Electron Device Lab., Ohio State U. Research Foundation, Columbus.
ANTIMONY DIFFUSION INTO SILICON THROUGH AN OXIDE LAYER, by M. O. Thurston and Hsing-San Lee. Quarterly technical rept. no. 5, 1 Jan-31 Mar 60, on Diffusion of Impurities into Silicon Through an Oxide Layer, on Contract DA 36-039-sc-83874. 10 Apr 60, 28p. 8 refs. RF 896-5; AD-238 084.

DESCRIPTORS: *Semiconductors, *Silicon, *Antimony, Dioxides, Oxidation, Diffusion, Impurities, Single crystals.

An investigation of antimony diffusion through the oxide layer, taking into account the growing oxide layer of both the preoxidized and the initially oxide-free silicon, has been carried out. A suitable equation for calculating the diffusion constant in the oxide layer is derived for this investigation, and the estimation of the error in the determination of the diffusion constant in the oxide layer due to the inaccurate measurements of the oxide layer thickness and the surface concentration ratio is studied. Experimental results on the diffusion of antimony in the closed box system are given. The diffusivity of the antimony in the oxide layer is found to be around 1×10^{-13} cm^2 sec^{-1} at the temperature of 1250°C for antimony. (Author)

TID-13193 $6.60

Illinois U., Urbana.
PARAMAGNETIC RESONANCE OF F-CENTERS IN ALKALI HALIDES, by W. C. Holton and H. Blum. [1961] 67p.

PB 158 304 $5.60

Illinois U., Urbana.
ELECTRICAL PROPERTIES OF THIN FILM SEMICONDUCTORS, by F. S. Ham and D. Mattis. Technical rept. no. 4 on Contract DA 11-022-ORD-1001. 10 June 55, 55p. 15 refs. OOR proj. 431; AD-71 054.

DESCRIPTORS: *Semiconductors, *Semiconducting films, Thin film, Electrical properties, Electrical conductance, Theory.

The theory of the electrical conductivity and Hall effect for thin metallic films as given by Fuchs and Sondheimer is extended to the case of a non-degenerate semiconductor with ellipsoidal energy surfaces. A change of variables reduces the problem to an equivalent and mathematically simpler one with spherical surfaces, but the transformed electric and magnetic fields

are not simply oriented with respect to the film. This generalized problem is solved to first order in the applied fields.

PB 156 702 $5.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
NONSYMMETRIC DEFORMATION OF DOME-SHAPED SHELLS OF REVOLUTION, by C. R. Steele. Technical rept. on Contract NOrd-17017. Dec 60, 60p. 9 refs. LMSD-895050; AD-252 352.

DESCRIPTORS: Structural shells, *Stresses, *Structures, Mathematical analysis, Bodies of revolution, Integral equations

Bending solutions that are uniformly valid in both shallow and non-shallow regions of a dome with arbitrary meridian are determined for edge loads that vary sinusoidally in the circumferential direction. The equations for the membrane and inextensional deformation solutions are reduced to a simple integral equation which eliminates the usual trial and error method of isolating the solutions that are regular at the apex. For a specific application, curves and formulas are obtained for the stresses and deformations of a dome with rigid rings clamped to the edges under the action of axial force, side force, and tilting moment. (Author)

PB 156 250 $2.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
ON THE SECOND VARIATION OF THE MEMBRANE STRAIN-ENERGY IN THIN-SHELL BUCKLING ANALYSIS, by D. O. Brush and B. O. Almroth. Technical rept. Dec 60, 23p. 6 refs. LMSD-895043; AD-250 685.

DESCRIPTORS: *Structural shells, Buckling, Theory, Structures, Mathematical analysis, Elasticity, Deformation, Energy, Membranes.

A simplified expression is derived for the second variation of the membrane strain-energy for a thin elastic shell of any shape. The expression is applicable in the infinitesimal buckling analysis of structural shells by means of the energy theory of buckling. The development emphasizes the fundamental importance in infinitesimal buckling analysis of nonlinear terms in the shell midsurface strain-displacement relations. It is shown that under certain circumstances the second variation of the membrane strain-energy may be written as the sum of two quantities, one of which is the linear-elasticity expression for the second variation of the membrane strain-energy, while the other corresponds to the quantity sometimes termed the work of the membrane forces during buckling. (Author)

PB 156 242 $4.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
SHELLS OF REVOLUTION WITH EDGE LOADS OF RAPID CIRCUMFERENTIAL VARIATION, by C. R. Steele. Technical rept. Dec 60, 44p. 8 refs. LMSD-895049; AD-252 045.

DESCRIPTORS: Structural shells, Bodies of revolution, *Elastic shells, Load distribution, Mathematical analysis

After an investigation of membrane theory, solutions to the general equations for a thin shell of revolution of arbitrary meridian are obtained for rapidly varying sinusoidal edge loading. The solutions from membrane theory are shown to be valid for shells near spherical shape but can give quite misleading results, particularly for shells of negative curvature. The bending or edge effect solutions also are shown to become significantly modified for the high harmonics. (Author)

PB 155 495 $2.60

Materials Research Lab., U. of California, Berkeley.
ON THE THERMALLY ACTIVATED MECHANISM OF PRISMATIC SLIP IN MAGNESIUM SINGLE CRYSTALS, by P. Ward Flynn, J. Mote, and J. E. Dorn. Technical rept. no. 7 on Contract DA 04-200-507-ORD-171, T. O. 6. 1 Dec 60, 26p. 17 refs. IER series no. 73, issue no. 2; OOR 821:7; AD-252 211.

DESCRIPTORS: Magnesium, *Crystals, Single crystals, Shear stresses, Deformation, Temperature, Creep, Theory, *Metallic crystals, Lattices, Crystal structure, Single crystals, Mathematical analysis.

The effect of strain and strain rate on the critical resolved shear stress for prismatic slip in specially oriented single magnesium crystals was determined over a range of temperatures in an effort to identify the thermally activated strain-rate controlling dislocation process. Below about 450 K prismatic slip was preceded by twinning and fracturing. Above 450 K extensive prismatic slip was obtained followed by fracturing. Neither the Peierls' mechanism nor the dislocation intersection mechanism can account for the observations. The data, however, are in excellent agreement with the dictates of Friedels' theory for cross-slip to the prismatic plane. (Author)

PB 156 072 $1.60

Metals Research Lab., Carnegie Inst. of Tech., Pittsburgh, Pa.
RATES OF GROWTH DURING SOLID-SOLID TRANSFORMATIONS, by H. W. Paxton. Final rept. on Contract DA 36-034-ORD-3087. 1 Mar 61, 15p. 42 refs. OOR rept. no. 1922:4; AD-253 852.

DESCRIPTORS: *Ferrites, *Austenite, Growth, *Single crystals, *Crystal structure, Carbon, Diffusion, Zone melting.

The kinetics and morphology of austenite produced by carburizing single crystals of zone-melted ferrite between A1 and A3 were studied. The austenite is frequently irregular and even acicular without any obvious consistent crystallographic relation or habit plane. Calculations of the rate of growth of austenite based on a model involving carbon diffusion as the controlling step give values lower than the observed penetration rates of acicular austenite, but consistent with those for the more uniform advance noted occasionally. (Author)

PB 171 992 $1.50

New York State Coll. of Ceramics, Alfred U.
SEMICONDUCTING MATERIALS. Annual rept. for Dec 59-Nov 60 on Contract Nonr-1503(01). [1960] 57p. 15 refs. AD-250 242.

DESCRIPTORS: *Semiconductors, Tellurides, Thermoelectricity, Photoconductivity, Cooling, Cadmium compounds, Boron compounds, Phosphides, Single crystals, Preparation, Electrical properties, Selenides, Bizmuth compounds, Mercury compounds, Lead compounds, Zinc compounds

Progress is reported on methods of preparing single and polycrystalline semiconducting compounds such as CdTe, HgSe, Bi_2Te_3, ZnTe, and PbTe. A series of hot pressed specimens were made to study the variation of properties with grain surface area. Variation of the molding time at constant temperature failed to produce the desired spread of grain sizes in CdTe and PbTe. Satisfactory samples of hot-pressed BP were prepared at temperatures from 1670 to 2024 C and some of their activation energies are presented. These appear to be a function of the degree of sintering rather than of pressure or temperature. Differential thermal analyses (DTA) were made on samples of CdSe, HgTe, TlSe, $Cu_{1.4}$ Te, and $PtTe_2$ prepared by wet chemical techniques. Hot pressing temperatures were selected from the DTA data and 2 or 3 samples of each were prepared. The HgTe, $Cr_{1.4}Te$, and $PtTe_2$ had low resistances. Refinements in the equipment for measuring Hall coefficients, photoconductivity, and Peltier effect are described.

PB 154 076 $1.60

Purdue U., Lafayette, Ind.
THE STOICHIOMETRY AND RESISTIVITY OF PrO_x, by A. F. Clifford and Paul A. Faeth. Rept. on Contract AF 18(603)45. 11 Nov 60, 14p. 8 refs. AFOSR-TN-60-1445.

DESCRIPTORS: *Praseodymium compounds, *Oxides, Resistance, Semiconductors, Phase transitions, Thermoelectricity, Hysteresis

Theoretical Physics

PB 158 110 $1.10

Carnegie Inst. of Tech., Pittsburgh, Pa.
LIGHT AS A PLASMA PROBE, by Michel Baranger and Bernard Mozer (Brookhaven National Lab.). Technical rept. no. 7 on Contract Nonr-760(15). 1960, 20p. 17 refs. AD-252 877.

DESCRIPTORS: *Plasma oscillations, *Light, *Atomic spectrum, Analysis, Measurement, Frequency, Forbidden transitions, Spectrographic analysis, Physical properties, Gas ionization

The effect of longitudinal plasma oscillations on atomic spectra is examined. It is shown that they should give rise to satellite lines, disposed symmetrically in pairs about a forbidden line and separated from it by the plasma frequency. Discussion is given of the circumstances under which these satellites should be strong enough to be observed. Their observation would amount to a measurement of the frequency and intensity of plasma oscillations. Spectroscopic observations of light emitted by ionized gases can be used to determine various properties of plasmas, such as the ion density and the temperature. (Author)

AD-257 397 $1.10

Electron Tube and Microwave Lab., Calif. Inst. of Tech., Pasadena.
STUDY OF ELECTROMAGNETIC INTERACTIONS IN PLASMAS, by R. W. Gould and D. G. Dow. Quarterly progress rept. no. 5, 1 Jan-31 Mar 61, on Contract DA 36-039-sc-85317. [1961] 8p.

This report released by the cognizant military agency for sale to the public 26 Sep 61.

DESCRIPTORS: Microwaves, *Plasma physics, Electron beams, *Plasma oscillations, Microwave oscillators, Cyclotrons, Electron tubes, Electromagnetic waves, Propagation, Cesium, Scattering, Measurement, Magnetic fields, Discharge tubes, Design, Tests, Mathematical analysis.

A cyclotron orbit plasma oscillator is being rebuilt with a tungsten cathode. A systematic study of the dispersion relation in a plasma with an electron beam and magnetic field was undertaken. The approach is to use the exact equations for wave propagation in formulation and make approximations only in the mathematical evaluation. A cesium plasma tube was tested and gives plasma densities in the range 10 to the 11th power ions/cu. cm. Construction started on a new cesium plasma tube which will be used to measure diffusion rates in a magnetic field. (Author)

PB 155 758 $4.60

Institute of Theoretical Physics, Stanford U., Calif.
ELECTRON-PROTON BREMSSTRAHLUNG, by R. A. Berg and C. N. Lindner. Technical note no. 32 on Contract AF 49(638)388. Dec 60, 42p. 12 refs. AFOSR-97.

DESCRIPTORS: *Electrons, *Protons, *Bremsstrahlung, Nuclear reactions, Scattering, Mesons, Pions, Production, Electron transitions, Photons, Compton effect.

A general form factor analysis is derived as a framework for discussing all proton bremsstrahlung processes. Specifically, the proton electromagnetic process and neutral pion exchange contribution are considered in addition to the pion-induced processes. The latter is treated conveniently, only within the framework of a static approximation. Numerical results are presented. (Author)

UCRL-9612 $3.60

Lawrence Radiation Lab., U. of California, Berkeley.
HYDROMAGNETIC IONIZING WAVES, by Wulf B. Kunkel and Robert A. Gross. Rept. on Contract W-7405-eng-48. 16 May 61, 39p.

PB 154 736 $1.60

Plasma Propulsion Lab., Republic Aviation Corp., Farmingdale, N. Y.
GENERALIZED PINCH DYNAMICS IN NONDIMENSIONAL FORM, by William J. Guman. Rept. on Contract Nonr-2851(00). May 60, 15p. 3 refs. PPL-TR-60-7; AD-246 561

DESCRIPTORS: *Plasma physics, *Magnetic pinch, Nozzles, Fluid flow, Differential equations, *Propulsion, Plasma jets, Ion rockets, *Dynamics, Analysis.

The equations of the snow plow pinch analysis for a pinch occurring in a fluid having initial velocity and density distributions have been put into nondimensional form and reduced to a set of three nonlinear differential equations that must be solved simultaneously. The electrode nozzle geometry selected converts radial pinch motion to an axial motion. (Author)

NYO-9748 $2.60

Rochester U., N. Y.
THE QUANTUM MECHANICAL SCATTERING PROBLEM, by Thomas F. Jordan. Rept. on Contract AT(30-1)-875. June 61, 27p.

TID-13220 $4.60

Yale U., New Haven, Conn.
ON THE INTERPRETATION OF THE FIELD THEORETICAL POTENTIAL IN TERMS OF PHASE SHIFTS by G. Breit. [1961] 50p.

Thermodynamics

ANL-6369 $1.50

Argonne National Lab., Ill.
ON THE MEASUREMENT OF THE DYNAMIC PROPERTIES OF THE STEAM VOID FRACTION IN BOILING WATER CHANNELS, by Ahti Tapio Eurola. Rept. on Contract W-31-109-eng-38. June 61, 61p.

PB 157 696 $8.60

Army Rocket and Guided Missile Agency, Redstone Arsenal, Ala.
COMPRESSIBLE FLOW TABLES k = 1.24 ISENTROPIC PROCESS, by C. Hoebich. Rept. on One-Dimensional Compressible Flow Tables for a Perfect Gas in Mach Number Increments of 0.001 (k = 1.24); Isentropic Process. Mar 61, 91p. ARGMA TN 1H1N-9; AD-234 442.

DESCRIPTORS: *Compressible flow, *Specific heat, Mach number, Functions, Tables, *Gases.

Functions are tabulated of Mach numbers for compressible perfect gas. The ratio of specific heats k is 1.24. The increment used in these tables is sufficiently small (0.001 Mach number) to eliminate time-consuming interpolation. These tables are for stagnation temperature change without friction. (Author)

NAA-SR-M-6411 $1.10

Atomics International, Canoga Park, Calif.
COMPARISON OF THERMAL EFFICIENCIES FOR A MERCURY-STEAM BINARY VAPOR CYCLE AND THE RANKINE CYCLE, by L. L. Prem. 19 May 61, 7p.

BMI-X-175 $1.10

Battelle Memorial Inst., Columbus, Ohio.
DEVELOPMENT OF MINIATURE HEATING ELEMENTS FOR A POWER-BALANCING TYPE THERMAL-FLUX SENSOR, by D. R. Grieser. 14 Aug 61, 10p.

TID-13088 $1.10

Columbia U., N. Y.
BASIC EXPERIMENTAL STUDIES ON BOILING FLUID FLOW AND HEAT TRANSFER AT ELEVATED PRESSURES. Monthly progress rept. Oct 60, on Contract AT(30-3)-187. 9p.

TID-12574 $1.10

Columbia U., N. Y.
BASIC EXPERIMENTAL STUDIES ON BOILING FLUID FLOW AND HEAT TRANSFER AT ELEVATED PRESSURES, by Bruce Matzner. Monthly progress rept. for May 61 on Contract AT(30-3)-187. 9p.

NYO-9647 $6.60

Columbia U., N. Y.
BASIC STUDIES IN HEAT TRANSFER AND FLUID FLOW. Quarterly progress rept. 1 Apr-30 June 61 on Contract AT(30-3)-187. 62p.

AD-255 753 repriced $1.25

Flight and Engineering Test Div., Wright Air Development Div., Wright-Patterson Air Force Base, Ohio.
COMMON PARALLEL THERMOCOUPLES FOR AVERAGE TEMPERATURE MEASUREMENT, by Bernard C. Boggs. Rept. for Feb-Apr 60 on Structural Testing of Flight Vehicles. Nov 60, 47p. 5 refs. WADD Technical rept. no. 60-650.

DESCRIPTORS: *Thermocouples, Temperature control, Aircraft, Electrical networks, Iron, Copper alloys, Nickel alloys, Test methods, Circuits, Measurement, Temperature.

The report describes the use of common parallel thermocouple circuits for temperature control in thermal simulation. Iron-constantan thermocouples were welded directly to the basic metal being heated. Structural tests at elevated temperatures show that thermocouples connected into parallel electrical circuits and grounded to a common metal sheet give the same temperature measurements as separated thermocouples connected into a parallel circuit. This method is applicable to any test situation requiring average temperatures. (Author)

APEX-657 $0.50

General Electric Co., Cincinnati, Ohio.
PHOTOTHERMOELASTIC INVESTIGATION OF HEXAGONAL PLATES, by Angelo Colao and Herbert Becker. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. Aug 61, 22p.

APEX-668 $0.50

General Electric Co., Cincinnati, Ohio.
PHOTOTHERMOELASTICITY TECHNIQUES AND APPLICATION, by Warren E. Greenwald. Rept. on Contract AF 33(600)-38062. and AT(11-1)-171. Aug 61, 23p.

HW-56821 $4.60

Hanford Atomic Products Operation, Richland, Wash.
TEMPERATURE TRANSIENTS IN UNDERGROUND TANKS STORING NUCLEAR PROCESS RESIDUES, by D. W. McLenegan. Rept. on Contract AT(45-1)-1350. July 58, 46p.

HW-65191 $1.10

Hanford Atomic Products Operation, Richland, Wash.
THERMAL HYDRAULIC BASES FOR SELECTED PRTR PROCESS SPECIFICATIONS, by J. M. Batch and T. W. Ambrose. Apr 60, 6p.

TID-13187 $8.10

Illinois U., Urbana.
THERMAL CONDUCTIVITY IN LIQUID He^3, by Ansel C. Anderson. Technical rept. no. 3 on Contract AT(11-1)-67, Project 22. May 61, 89p.

PB 156 065 $11.00

Illinois U. Engineering Experiment Station, Urbana.
DEVELOPMENT OF TEMPERATURE PROFILE FOR TURBULENT HEAT EXCHANGE IN A PIPE, by Thomas J. Hanratty and Robert E. Johnk. Technical rept. no. 10 on Exploration and Application of Turbulence Theory, Contract DA 11-022-ORD-1707. Feb 61, 146p. 35 refs. OOR rept. no. 1256:13; AD-253 399.

DESCRIPTORS: *Turbulent flow, Heat transfer, Pipes, *Thermal diffusion, Theory, Tests, Mathematical analysis, Measurement, Gas flow, Pressure gages, Thermocouples, Temperature, Air.

Data on radial temperature distribution were obtained in the thermal entrance region of a fully developed turbulent flow of air in a pipe. Uniform wall heat flux was employed in the heat transfer section, which was long enough to allow the temperature profile to become fully developed. The data are used to examine the validity of analytical approaches to the problem which are based on an analogy between heat and monentum transfer. Empirical expressions describing fully developed and entrance region temperature profiles were obtained. The entry region data show that the temperature profiles close to the wall attain their fully developed shape rapidly after the flow enters the heat transfer section. Eddy diffusivity profiles calculated in the entrance region vary with distance downstream from the entrance, indicating an effect of time dependency of the turbulent diffusion process. (Author)

TID-12824 $5.60

Kaiser Engineers, Oakland, Calif.
METAL SHEATHED, REFRACTORY INSULATED THERMOCOUPLE FOR NUCLEAR REACTOR. July 60, 51p.

TID-13222 $2.60

Michigan U., Ann Arbor.
THE ENTHALPY OF MIXING OF SOLID SOLUTIONS. THE BINARY SYSTEM TETRAMETHYLMETHANE-TETRACHLOROMETHANE, by Edgar F. Westrum, Jr. and Elfreda Chang. [1961] 22p.

NUMEC-P-31 $1.60

Nuclear Materials and Equipment Corp., Apollo, Pa.
DESIGN STUDY OF THE MEASUREMENT OF THERMAL CONDUCTIVITY OF POOR CONDUCTORS AT HIGH TEMPERATURES BY THE USE OF POINT AND UNIFORM PLANE SOURCES OF HEAT, by Eber K. Halteman. Technical rept. on Contract AT(30-1)-2389. 2 June 61, 20p.

CF-61-6-16 $5.60

Oak Ridge National Lab., Tenn.
HEAT TRANSFER ANALYSIS OF PEBBLE BED REACTORS AND COMPARISON WITH PRISMATIC CORPS, by N. Ozisik, R. B. Korsmeyer, and G. L. Rhoden. 29 June 61, 56p.

PB 181 032 $2.75

Pratt and Whitney Aircraft, East Hartford, Conn.
THERMODYNAMIC PROPERTIES OF IONIZED AND DISSOCIATED AIR FROM 1500°K TO 15,000°K, by F. Landis and E. N. Nilson. Jan 61, 126p. 11 refs. P&WA rept. no. 1921.

DESCRIPTORS: *Air, *Thermodynamics, Gas ionization, Tables, Dissociation, Ionization

Tables are presented listing the thermodynamic properties of dissociated and ionized air from 1,500°K to 15,000°K. In addition to the basic state variables, such as temperature, density, pressure, enthalpy and entropy, the tables also list electron concentration and differentiated properties including specific heats, specific heat ratio, isentropic expansion coefficient and sound velocity. These differentiated properties have been obtained by a novel direct numerical interpolation and differentiation technique, the so-called "spline fit", which is described in detail in the appendix. (Author)

PB 158 140 $3.60

Theoretical Chemistry Lab., U. of Wisconsin, Madison.
INTRODUCTION TO IRREVERSIBLE PROCESS, by J. De Boer. Rept. on Chemistry of Flames and Related Reaction Kinetics, Contract AF 33(616)3414. Dec 60, 32p. ARL Technical note 60-156; AD-250 261.

DESCRIPTORS: *Thermodynamics, Gases, Motion, *Flames, Entropy.

A presentation is given of the thermodynamics of irreversible processes. The topics covered include: an evaluation of irreversible entropy production in simple systems, cross-effects in the thermodynamics of irreversible processes, a discussion of the principle of minimum entropy production, the connection between irreversible processes and Brownian motion, and a proof of the Onsager relations. (Author)

TID-13192 $3.60

Wisconsin U., Madison.
THERMODYNAMICS OF ASSOCIATION OF IRON (III) ION AND CHLORIDE ION IN AQUEOUS SOLUTION, by M. John Mark Woods, Patrick K. Gallagher, and Edward L. King. Rept. on Contract AT(11-1)-64, Proj. 3 [1960] 38p.

Wave Propagation

PB 157 633 $11.50

Collins Radio Co. [Cedar Rapids, Iowa].
TROPOSPHERIC SCATTER PRINCIPLES AND APPLICATION, INSTRUCTION MANUAL. Rept. on Contract DA 36-039-sc-67491. Mar 60, 159p. USAEPG-SIG 960-67; AD-240 280.

DESCRIPTORS: *Radio waves, Scattering, *Instruction manuals, Atmosphere, Amplitude modulation, *Radio equipment, *Radio communication systems, Frequency modulation.

Contents:
Logarithms and decibels
Radio wave propagation
Principles of tropospheric scatter
Modulation techniques
Noise and interference
FM exciters
Power amplifiers
FM receivers
Transmission lines and antennas
Planning prediction, and installation procedures for tropospheric scatter circuits

PB 155 200 $4.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
PRECISION TROPOSPHERIC RADIO REFRACTION CORRECTIONS FOR RANGES FROM 10 - 500 NAUTICAL MILES, by J. R. Bauer and F. A. Wilson. Rept. on Contract AF 19(604)7400. 20 Feb 61, 47p. 2 refs. 33G-0015; AD-252 572.

DESCRIPTORS: Atmosphere, Stratosphere, *Radio ranges, Radar ranges, Height finding, Angle of arrival, *Target position indicators, Refraction, Corrections, Tables.

Computed elevation angle and slant range refraction corrections as well as true target height and polar angle as measured from the center of curvature of the earth are tabulated as functions of the two basic radar outputs: measured slant range and elevation angle of arrival. The mean is assumed. Tables of computed quantities are given in the measured slant range interval 10-500 naut mi and elevation of arrival region 0-90 degrees. Computational errors in target height and true slant range are less than a few feet at all ranges while errors in angles are of the order of 1/1000 degrees or less. At heights below the ionosphere (60 km or less) these results will be applicable at all radio frequencies. For heights extending from sea level through the ionosphere the full utility of the tables will be confined to frequencies above a few kilomegacycles. (Author)

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

PB 181 034 $3.50

Army Research Office, Durham, N. C.
RESEARCH IN PROGRESS DURING CALENDAR YEAR 1960 UNDER THE AUSPICES OF THE OFFICE OF ORDNANCE RESEARCH, U.S. ARMY. [1961] 247p. 1200 refs.

DESCRIPTORS: *Military research, *Scientific research, *Physics, *Chemistry, *Mathematics, *Engineering, *Metallurgy.

Each research project supported during Calendar Year 1960, in the fields of physics, chemistry, mathematics, engineering, and metallurgy is described. For each project completed during 1960 the titles of all technical reports pertaining thereto, regardless of the year in which the reports appeared, are given. For those projects continued into 1961 only the reports issued during 1960 are described by title.

AD-259 994 repriced $3.00

Brooklyn Coll., N. Y.
RESEARCH IN THE AUTOMATION OF TEACHING, by Carl B. Zuckerman, George R. Marshall, and Sanford Groesberg. Rept. on Contract N61339-661. 16 Feb 61, 164p. 1 ref. Technical rept. NAVTRADEVCEN 661-1.

DESCRIPTORS: *Teaching machines, Automation, Training, Training devices, Circuits, Wiring diagrams, Effectiveness, Learning.

The Skinner Teaching Machine was compared with more traditional teaching methods. Material from the U. S. Navy Basic Electricity course was used. For the first experiment, material was programmed into 3 series of items: one of completion, one of multiple-choice and one of true-false items. Each series was presented in a logical order and in a random sequence. Six groups of subjects were used, one for each kind of presentation (i. e., Random Completion, Sequential, True-False, etc.). Statistical analysis of the results revealed no significant difference between random and sequential presentation, between the different kinds of items or between machine and prompting card learning. In later experiments, a group of subjects learned the same material by means of a lecture presentation and another group by reading the text. Both groups received the same examination as those in the first experiment. The text group did significantly better than the machine group and better than the lecture group. The lecture group did significantly better than the machine group. (Author)

PB 157 483 $1.60

Carnegie Inst. of Tech. Graduate School of Industrial Administration, Pittsburgh, Pa.
AN EXPERIMENTAL APPROACH TO ASCERTAINING THE EFFECTS OF AN AUDIT, by N. C. Churchill and W. W. Cooper. ONR Research memo. no. 75 on Planning and Control of Industrial Operations, Contract Nonr-760(01). Oct 60, 15p. 8 refs. AD-246 167.

DESCRIPTORS: *Management engineering, Control, Test methods, Test equipment, Design, Industry.

This report will not reproduce well.

Using the activities and literature of the auditing profession as a guide, each model and each experiment discussed is designed so that it also encompasses elements that are common to other uses of auditing by management. The experiment discussed in this paper, for example, is modeled around the activities of accounting auditors. But it also includes aspects of auditing effects which are germane to aspects of what might be called self management as it might be used to deal with problems in managerial coordination and control. (Author)

PB 156 241 $9.10

Lockheed Aircraft Corp., Sunnyvale, Calif.
DIGITAL DATA PROCESSOR FOR PATTERN RECOGNITION EXPERIMENTS, by L. D. Healy. Technical rept. Jan 61, 105p. 17 refs. LMSD-895013; AD-251 760.

DESCRIPTORS: *Data processing systems, Computers, Digital computers, Memory devices, Trigger circuits, Magnetic recording systems.

A technique for design of a net of linear threshold devices which can classify binary patterns has been described in the literature. The usefulness of such a net in classifying patterns outside the set around which the system was designed can be demonstrated only by experiment. Although such experiments can be conducted by simulation of the networks on a large, general-purpose digital computer, the amount of computation time required makes such simulation impractical in most cases. The system study, logical design, mechanization, and check-out of a special-purpose digital device for neuron-net simulation of the networks are described. The system is designed for simpler operation than possible with a large computer, and takes full advantage of components already available in the laboratory, or easily available commercially. (Author)

PB 154 195 $5.60

Michigan U. Coll. of Literature, Science, and the Arts, Ann Arbor.
DECISION PROBLEMS OF FINITE AUTOMATA DESIGN AND RELATED ARITHMETICS, by Calvin C. Elgot, Thesis. Technical rept. on NSF Grant G-4790; Contracts Nonr-1224(21), DA 20-018-ORD-16971, and DA 36-039-sc-78057. June 59, 55p. 10 refs. 2722; 2794; 2755-6-T

DESCRIPTORS: *Mathematical logic, *Computers, Design, Theory

Certain formal arithmetics may be employed as design languages for finite automata. In these arithmetics (design) conditions, the notion of automaton, and the notion of an automaton satisfying a condition are all expressible. An automaton satisfies a condition if a certain formula of the arithmetic is valid. For certain arithmetics algorithms are produced which enable one to decide (1) whether a given automaton satisfies a given condition, (2) whether there exists an automaton satisfying a given condition (and if there is one, producing one), (3) whether there exists at most one automaton satisfying a given condition, (4) whether a given sentence is true. These results make use of a theorem (5.3) which characterizes finite automata behavior by means of formulas of an arithmetic. For certain other arithmetics, it is shown that algorithms of the type indicated above fail to exist. (Author)

PB 161 613 $2.50

National Bureau of Standards, Washington, D. C.
AUTOMATIC CHARACTER RECOGNITION. A STATE-OF-THE-ART REPORT, by Mary Elizabeth Stevens. May 61, 168p. 549 refs. Technical note no. 112.

DESCRIPTORS: *Reading machines, Design, Bibliography, Reasoning, Learning, Perception, Theory, Computers, Automatic.

A state-of-the-art report on current progress in automatic character recognition is presented. Areas of applicability and possibilities for controlled solutions to automatic character reading problems are discussed. Some commonly used methods for character recognition, the steps involved in a generalized recognition process, and comparative characteristics of certain representative character recognition systems are considered. Prospects for further progress, including potentially related research in pattern recognition, are reported. (Author)

CF-61-6-27 $2.50

Oak Ridge National Lab., Tenn.
PAPERS PUBLISHED IN JOURNALS AND PRESENTED AT MEETINGS, REPORTS ISSUED, AND THESES COMPLETED, DURING 1960, BY ORNL STAFF MEMBERS. 110p.

PB 171 984 $2.75

Stanford Research Inst., Menlo Park, Calif.
RESEARCH ON THE PHILOSOPHY OF LOGIC REALIZATION, by D. C. Engelbart and J. L. Haynes. Final rept. 15 Apr 59-28 Mar 60, on Contract AF 33(616)6303. May 60, 147p. 195 refs. WADD-TR-60-285; AD-250 966.

DESCRIPTORS: Theory, *Scientific research, Electronic circuits, *Digital computers, Digital recording systems, *Digital systems.

Contents:
General problems, orientation, and procedures
Scheme description
Scheme function
Stripped and augmented schemes
Generalization hierarchy
Scheme complexity and simplicity ordering
Scheme fragments and sub-schemes
Scheme work
Skeletal networks
Temporary storage
Digital transmission
Fan-out
Fan-in and logic
Dimensional scaling

The abstraction of schemes for study
Bibliographical study
Representative schemes
Miscellaneous schemes and scheme fragments

Communication Theory

PB 158 165 $12.00

Armour Research Foundation, Chicago, Ill.
INVESTIGATION AND STUDY OF ERROR DETECTION AND CORRECTION FOR DATA LINK, by E. S. Schwartz. Final rept. on Contract AF 30(602)1729. 31 Jan 59, 166p. 105 refs. ARF Proj. no. E086; RADC-TR-59-19; AD-210 397.

DESCRIPTORS: *Data transmission systems, *Communication systems, Errors, Detection, Corrections, Reliability, Coding.

An investigation and study of the application of error detection and error correction techniques has been made for the purpose of enhancing the reliability of data communication systems. The study includes an analysis of coding in the presence of noise and a fading signal, utilizing various techniques for error reduction, error detection, and error correction of single and multiple errors in unidirectional and bidirectional systems. Figures of merit are derived to provide a common basis for comparing and evaluating different reliability enhancement techniques. The practical aspects of employing coding techniques for improving communication reliability within the constraints of an operational communication system are considered. A figure of merit for various codes is derived for the system considering slow and fast fading conditions and a quadruple diversity receiver system using square-law combination and switching circuits. A single parity coded information feedback system was found to achieve the greatest improvement in reliability with the smallest sacrifice of channel capacity. In applications where the use of a feedback channel is not feasible, it is possible to combine techniques of marginal-error detection and redundant coding to achieve the same error probability with approximately the same use of redundancy, as in the case of the information feedback system. (Author)

PB 158 067 $1.60

Computation Center, Carnegie Inst. of Tech., Pittsburgh, Pa.
THE USE OF THREADED LISTS IN CONSTRUCTING A COMBINED ALGOL AND MACHINE-LIKE ASSEMBLY PROCESSOR, by A. Evans, Jr., A. J. Perlis, and H. Van Zoeren. Technical rept. no. 3 on Contract Nonr-760(18). 29 Nov 60, 17p. AD-247 476.

DESCRIPTORS: *Digital computers, Computers, Language, *Machine translation, Programming, Coding.

ALGOL which is intended to be a language for universal communication of algorithms is discussed with respect to machine-language assembly system. In its terms, procedures can be disseminated among different nations and users of different computers. A Bendix G-20 high-speed binary computer having words (numbering up to 2 to the 15th power) of 32-bit memory in cores will be used to process information derived from the ALGOL system. Input and output is by typewriter, cards, paper tape, and printer. All in/out units are on interrupt lines, and can be buffered. Arithmetic is performed in extended precision floating-point, though quantities can be stored as integers, logical words, or single or double precisions floating-point quantities. Translation proceeds in 3 passes: (1) translates the linear character string of ALGOL statements into a threaded list: (2) translates programs in threaded-list form into relocatable G-20 machine code: and (3) when the scheduling routine determines that a program can be run, it will allocate space for it in core and then load it, relocating all instructions. A site is defined as a place in the machine that can be occupied by a symbol, threaded list (Tlist), or address specifying the site of a symbol. To access information in a Tlist, each list may be sequenced at any time by word, element, and list.

PB 158 134 $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE APPLICATION OF THE THEORY OF SIGNAL DETECTABILITY TO SIGNALS WITH UNKNOWN POLARIZATION AND PHASE, by R. Manasse. Rept. on Contract AF 19(122)458. 20 Aug 56, reissued 2 May 60. 30p. 13 refs. Group rept. 32-25; AD-236 167.

DESCRIPTORS: *Communications theory, *Radar signals, Polarization, Phase detectors, Radar receivers, Signal-to-noise ratio, Mathematical analysis, Detection, *Detectors, *Radio signals.

The general theory of signal detectability is reviewed. In particular, the theory is summarized for signals in additive white noise which are known exactly and known except for phase. The theory is extended to include signals with known polarization. The optimum receiver, a likelihood ratio detector, may be implemented by an appropriate processing of outputs from linear filters matched to orthogonal components of signal polarization. Study is made of the detection of signals with unknown polarization and phase. The problem is important in radar because of the loose correlation which often exists between the received and transmitted polarizations. A particular assumed a priori distribution of polarization and phase leads to a likelihood detector whose performance is independent of the actual signal polarization and phase. The resulting signal detectability in the region of interest is only slightly degraded with respect to the situation where the signal is known except for phase. As before, the receiver may be implemented by an appropriate combination of the linear filters matched to orthogonal components of signal polarization. An important conclusion of this study is that the total effective target cross section is basically more significant in determining the detectability than is the effective cross section corresponding to a particular received polarization. Detectability curves and tables are presented for the various cases of interest. (Author)

PB 154 930 $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
COLLECTED ERROR STATISTICS UTILIZING FOUR MODEMS OVER VARIOUS TELEPHONE CIRCUITS, by E. J. Hofmann. Rept. on Contract AF 19(604)7400. 23 Jan 61, 20p. 9 refs. 25G-0028; AD-251 571.

DESCRIPTORS: *Telephone communication systems, *Circuits, *Digital systems, Errors, *Statistical data

A method was described of recording digital error data and the manner in which it was analyzed and/or edited to obtain a set of IBM cards. The four modulation-demodulation systems and the various telephone circuits which were tested are described. Limitations and idiosyncrasies in the method of collection are pointed out. The resulting deck of cards, containing over 2000 hours of recorded data, may be used to check the performance of various error detecting and/or correcting schemes. (Author)

PB 153 108-1 $1.60

Lincoln Lab., Mass., Inst. of Tech., Lexington.
DETERMINATION OF R_{cutoff} FOR ASYMMETRIC CHANNEL, by Barney Reiffen. Rept. on Contract AF 19(604)7400. 3 Mar 61, 15p. 3 refs. 25G-0021, rev. 1; AD-252 498.

DESCRIPTORS: *Communications theory, *Information theory

In Lincoln Laboratory Technical Report 231, the author defined a computation cutoff rate for a discrete memoryless channel symmetric at its output with equally likely inputs. For information rates less than the cutoff rate, sequential decoding may proceed with an average number of decoding computation which does not grow exponentially with constraint length n. The cutoff rate is defined for the general non-degenerate discrete memoryless channel with arbitrary input probabilities. (Author)

PB 154 853 $5.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
ERROR STATISTICS ON THE COLLINS KINEPLEX OVER VARIOUS MEDIA, by Erhard J. Hofmann, Paul L. Grant, and Earl H. Harvey. Rept. on Contract AF 19(604)7400. 12 Jan 61, 60p. 13 refs. 25G-0024; AD-251 447.

DESCRIPTORS: *Data transmission systems, Errors, Analysis, Statistical analysis, Telephone lines, Microwave relay systems, Tables.

The results of data measurements made to evaluate the performance of the Collins Kineplex TE-206 data system (300 bits per second) over various types of private line telephone facilities (K-carrier and microwave TD-2 circuits) are described. A complete statistical analysis is made which shows the normal occurrence of errors to be quite low for K-carrier circuits and a magnitude worse for microwave circuits. (Author)

PB 154 854 $6.60

Lincoln Lab., Mass. Inst. of Tech., Lexington
ERROR STATISTICS UTILIZING THE MILGO DATA SYSTEM OVER VARIOUS MEDIA, by Erhard J. Hofmann and Paul L. Grant. Rept. on Contract AF 19(604)7400. 23 Jan 61, 53p. 6 refs. 25G-0025; AD-251 510.

DESCRIPTORS: *Data transmission systems, Errors, Analysis, Statistical analysis, Telephone lines, Microwave relay systems, Tables

The summary and analysis of the data measurements made over various looped telephone circuits at the Group 25 Test Room are presented. A complete statistical analysis of the error data recorded by an ADDER was made, and shows the normal occurrence of errors to be quite low. The performance of the Milgo digital data system was evaluated using four separate private wire, looped telephone circuits. These included three TD-2 microwave circuits and one K-carrier circuit. (Author)

SOCIAL SCIENCES

PB 181 027 $1.50

Army Transportation Research Command, Fort Eustis, Va.
MONOGRAPH ON RIGHTS IN INTELLECTUAL PROPERTY, by James W. Colvin. Jan 61, 52p. TREC rept. 61-5.

DESCRIPTORS: *Patents, *Inventions, Theory.

Contents: What is a patent? What is a patentable invention? Who may apply for a patent? How is a patent obtained? How are rights in patents transferred? How are patents used in industry? What is patent infringement? What are the patent rights of government employees? What action should an employee take to insure patent protection of his invention? Should the government obtain patent rights? What are the responsibilities of government employees in obtaining patent rights for the government? What are a government contractor's rights in his invention? What procedure is followed in handling patent applications for classified inventions? What are foreign patents? What is a design patent? What is a trademark? What is a copyright? What is technical data? What is copyrighted data and how does it affect government personnel? What is "proprietary data" and how is it dealt with in government contacts? What is "other data" and how is it handled in government contracts? When may data be acquired or received under restrictions?

PB 157 340 $3.60

Carnegie Inst. of Tech. Graduate School of Industrial Administration, Pittsburgh, Pa.
COMPUTATION OF EXPANSION RATES FOR THE GENERALIZED VON NEUMANN MODEL OF AN EXPANDING ECONOMY, by Michael J. Hamburger and Gerald L. Thompson. ONR Research memo no. 72 on Planning and Control of Industrial Operations, Contract Nonr-760(01). Sep 60, 37p. 8 refs. AD-246 717.

DESCRIPTORS: *Economics, *Economic conditions, Growth, Measurement, Games theory, Mathematical analysis, Matrix algebra, Digital computers, Programming, *Industrial production.
United States data was applied to the generalized von Naumann model of an expanding economy which was developed by Kemeny, Morgenstern and Thompson in order to obtain a meaningful measure of economic expansion and growth. The data used was input - output data for 1919, 1929, 1939 and 1947. In each year three models were considered: (1) an unaggregated model composed of fourteen industries (thirteen industries for 1947); (2) a partially aggregated model composed of nine industries; and (3) a totally aggregated model consisting of just one industry. The paper is divided into two sections: (1) the development of a search technique to find the maximum and minimum expansion factors for an economy; and (2) the application to the input output data of the technique developed in the first section. (Author)

PB 155 555 $1.60

Documentation Inc. [Washington, D. C.]
EXPERIMENTS WITH THE IBM-9900 AND A DISCUSSION OF AN IMPROVED COMAC AS SUGGESTED BY THESE EXPERIMENTS, by Mortimer Taube. Rept. on Contract AF 49(638)91. Apr 61, 20p. 2 refs. AFOSR-475.
DESCRIPTORS: *Data storage systems, Information theory, Documentation, Instrumentation, Design, Coding, Computers, Mathematical computer data
This paper presents the system and machine considerations which led, in the first instance, to the development of the design of a Continuous Multiple Access Comparator; a description of the IBM 9900, which is IBM's reduction to practice of the COMAC principle; certain improvements in design of the COMAC to make it a more efficient low-priced device for the storage and retrieval of information; and finally, the concept of using a wholly new method of logical comparison in order to achieve maximum efficiency from the use of E. P. P. equipment in the storage and retrieval of information. (Author)
PB 158 034 $1.10

Numerical Analysis Research, U. of California, Los Angeles.
A NOTE ON PYRAMID-BUILDING, by Zivia S. Wurtele. Rept. on Contract Nonr-233(02). 18 Nov 60, 5p. 5 refs. Management Sciences Research Project Research rept. no. 68; AD-251 481.
DESCRIPTORS: *Economics, Scheduling, Growth, *Matrix algebra, Industrial production, Industry.
The effect on the rate of balanced growth of adding to a closed Leontief-type economy industries whose outputs are used neither directly nor indirectly for the production of consumption goods is discussed. It is found that under certain conditions the enlargement of the economy in this way is not compatible with balanced growth and positive outputs for all sectors of the economy. (Author)

MISCELLANEOUS

PB 171 323 $1.25, $10.00/year

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS. Oct. 61.
DESCRIPTORS: *Naval research, *Scientific research, Speech transmission, Intelligibility, Vehicles, Automatic, Control, Atmosphere, Astrophysics, Fission product activity, Radioactivity, Light, Transmission, Water vapor, India, Ethanols, Amines, Refractive index, Chemistry, Electricity, Solid state physics, Rare earths, Infrared spectroscopy, Diodes, Fuel cells, Generators, Mechanics, Pressure vessels, Failure (Mechanics), Photoelastic materials, Machines, Shipborne, Shock, Hypervelocity projectiles, Ammunition damage, Nuclear physics, Neutrons, Gamma rays, Monitors, Inelastic scattering, Radioactive isotopes, Carbon, Radio, Radiosondes, Buoys, Electron beams, Amplifiers, Frequency, Thin films, Hydrostatic pressure, Embedding substances.
Contents:
Articles:
Wide-Angle Electro-Optic Crystal, Ophthalmic Shutter, by J. W. Davisson and S. L. Slawson
Thermal Expansion and D. T. A. Characteristics of Eight Phosphors, by K. G. Skinner
Scientific program:
Applications Research: Effects of transmission band and message context on speech intelligibility. Comparison of quickened and unquickened displays for the monitoring of vehicle performance under full automatic control
Atmosphere and Astrophysics: Fission product radioactivity in the air along the 80th meridian (west) during 1960. Transmission of light signals beyond the horizon. Vertical distribution of water vapor over Hyderbad India
Chemistry: Factors affecting the determination of monoethanolamine normality by refractive index measurement
Electricity: Tunnel diode static inverter obtains practical working voltages from thermoelectric, thermionic, and fuel cell generators
Mechanics: Method for measuring resistance to the splitting and unwinding typical of some failures in tl outer hoop-wound layers of fiberglass pressure vessels. Comparison of the static and dynamic properties of several photoelastic model materials. Shock studies of shipboard machinery and equipment. Hypervelocity projectile impact damage to a nonmetallic target
Metallurgy and Ceramics: Examination of fracture replica fidelity. Crack-propagation resistance of low-alloy steels. Anomalous fracture in the creep of nickel. Crack propagation in air and in vacuum for nickel and a nickel-chromium-aluminum alloy. A thermoelectric transducer for measuring solidification rates. Effect of irradiation temperature on the notch-ductility properties of reactor pressure vessel steels. Removal of interstitial impurities from niobium by zinc-niobium compounds. Cathodic polarization with aluminum-zinc anodes
Nuclear and Atomic Physics: Inelastic neutron-gamma angular correlation for the $C^{12}(n, n, \gamma)C^{12}$ reaction. Portable underwater radiation monitor
Radio: Transonsonde performance during recent flights. Measurements using polarization instrumentation radar on navigational buoys. Electron beam interaction in a Cuccia coupler and its effect on quadrupole amplifier performance. Technique for measuring small frequency and time deviations. Transport in thin films
Solid State Physics: Infrared crystal spectra of rare earth oxides
Sound: Hydrostatic pressure protection afforded to electronic components by potting methods and materials

A D INDEX

AD No.	Div.
262 300	25
262 301	30
262 303	30
262 306	19
262 307	16
262 308	25
262 309	30
262 310	9
262 311	9
262 312	9
262 313	9
262 314	25
262 317	2
262 318	2
262 319	2
262 320	2
262 321	2
262 322	2
262 323	2
262 324	19
262 325	2
262 326	2
262 327	2
262 328	2
262 330	4
262 331	20
262 332	30
262 333	30
262 334	8
262 335	10
262 337	17
262 338	10
262 339	22
262 343	6
262 345	8
262 348	8
262 349	15
262 350	15
262 351	25
262 352	25
262 353	25
262 354	25
262 355	8
262 356	10
262 357	5
262 358	12
262 360	28
262 362	25
262 367	10
262 368	10
262 373	4
262 374	25
262 375	25
262 376	7
262 379	26
262 381	8
262 382	8
262 383	12
262 384	12
262 385	12
262 388	25
262 389	20
262 391	8
262 392	22
262 393	2
262 394	20
262 395	2
262 399	16
262 400	15
262 404	30
262 407	17
262 410	9
262 411	8
262 412	8
262 414	30
262 415	8
262 416	25
262 417	8
262 418	25
262 419	2
262 420	2
262 421	8
262 422	8
262 423	8
262 424	8
262 425	8
262 426	15
262 427	23
262 429	8
262 430	25
262 433	28
262 435	16
262 437	7
262 438	8
262 439	4
262 440	20
262 441	25
262 442	25
262 443	25
262 444	20
262 445	30
262 447	15
262 448	12
262 450	22
262 452	9
262 453	15
262 454	8
262 455	12
262 457	25
262 458	25
262 459	19
262 460	8
262 461	8
262 462	25
262 463	8
262 464	30
262 465	1
262 466	30
262 468	12
262 469	12
262 470	12
262 471	2
262 472	8
262 480	25
262 481	30
262 490	8
262 492	3
262 493	15
262 495	9
262 496	17
262 497	17
262 498	28
262 499	16
262 500	8
262 501	30
262 502	4
262 510	2
262 511	7
262 512	7
262 513	8
262 514	8
262 516	13
262 518	2
262 519	8
262 520	8
262 521	25
262 522	8
262 523	8
262 524	25
262 525	25
262 526	8
262 527	25
262 528	7
262 530	27
262 531	27
262 533	28
262 534	8
262 535	25
262 536	25
262 537	25
262 538	12
262 540	1
262 541	16
262 542	30
262 543	12
262 544	5
262 550	32
262 552	9
262 553	17
262 554	6
262 555	17
262 565	14
262 566	12
262 573	22
262 575	4
262 581	28
262 582	30
262 583	16
262 584	20
262 585	30
262 589	17
262 591	25
262 592	25
262 593	25
262 595	7
262 598	25
262 599	12
262 600	28
262 601	2
262 602	20
262 603	30
262 604	17
262 605	4
262 606	27
262 607	27
262 608	25
262 609	12
262 610	12
262 611	25
262 612	25
262 613	6
262 614	2
262 615	27
262 616	7
262 617	7
262 618	12
262 619	12
262 620	9
262 621	12
262 622	17
262 631	12
262 632	9
262 633	30
262 634	30
262 635	16
262 638	25
262 639	8
262 640	22
262 643	20
262 644	20
262 645	20
262 646	8
262 647	21
262 648	31
262 649	12
262 651	7
262 654	25
262 655	22
262 661	2
262 662	8
262 664	8
262 666	8
262 667	30
262 668	10
262 670	29
262 672	15
262 673	25
262 680	25
262 681	30
262 685	3
262 688	2
262 692	25
262 694	8
262 695	26
262 696	9
262 697	15
262 699	25
262 701	4
262 702	5
262 703	5
262 705	9
262 706	4
262 707	8
262 708	15
262 709	8
262 710	17
262 711	8
262 712	9
262 713	4
262 714	22
262 715	25
262 716	14
262 717	1
262 719	22
262 720	8
262 721	2
262 722	16
262 725	8
262 727	14
262 728	25
262 729	25
262 730	25
262 732	17
262 734	9
262 735	26
262 736	15
262 737	7
262 738	18
262 739	9
262 740	25
262 742	28
262 744	29
262 746	25
262 752	2
262 753	2
262 754	2
262 755	22
262 757	15
262 758	22
262 761	29
262 762	2
262 763	8
262 765	16
262 766	14
262 767	14
262 768	25
262 769	1
262 770	10
262 771	28
262 772	8
262 774	8
262 775	27
262 776	8
262 777	30
262 779	23
262 780	16
262 781	12
262 790	30
262 791	2
262 792	19
262 793	4
262 794	9
262 796	14
262 797	2
262 798	15
262 799	2

AD No.	Div.
262 800	25
262 801	25
262 802	25
262 805	14
262 806	4
262 807	8
262 810	29
262 811	16
262 813	16
262 814	16
262 815	17
262 816	17
262 819	30
262 829	15
262 830	8
262 832	10
262 833	10
262 840	30
262 842	9
262 843	9
262 846	8
262 847	4
262 848	8
262 849	32
262 850	20
262 852	11
262 876	9
262 878	15
262 880	29
262 882	32
262 888	27
262 889	2
262 891	2
262 897	30
262 898	22
262 901	26
262 905	26
262 906	30
262 907	22
262 909	14
262 910	24
262 912	30
262 913	8
262 915	9
262 916	8
262 917	30
262 918	15
262 919	26
262 921	6
262 922	5
262 923	25
262 924	22
262 925	8
262 926	19
262 927	8
262 928	8
262 929	10
262 930	9
262 931	24
262 934	30
262 935	32
262 936	16
262 937	23
262 938	30
262 939	30
262 940	8
262 942	14
262 943	31
262 944	12
262 945	12
262 946	12
262 947	17
262 948	31
262 949	2
262 950	20
262 951	9
262 952	31
262 953	4
262 954	25
262 955	26
262 958	32
262 959	15
262 965	2
262 966	25
262 968	8
262 970	25
262 972	30
262 973	25
262 974	25
262 976	1
262 977	15
262 978	16
262 985	25
262 986	27
262 987	17
262 988	12
262 989	10
262 991	25
262 992	16
262 993	25
262 994	17
262 995	25
262 996	9
262 997	9
262 999	8
263 004	1
263 005	30
263 007	14
263 009	16
263 010	30
263 011	29
263 013	27
263 014	25.
263 016	9
263 017	22
263 020	2
263 021	2
263 022	6
263 025	6
263 027	15
263 028	16
263 030	26
263 031	14
263 038	23
263 040	2
263 041	13
263 042	12
263 043	1
263 044	7
263 047	1
263 048	25
263 049	27
263 050	15
263 053	1
263 054	25
263 056	8
263 057	30
263 059	14
263 060	2
263 061	25
263 062	8
263 067	15
263 069	2
263 071	12
263 072	12
263 073	12
263 074	9
263 075	1
263 076	12
263 077	1
263 078	12
263 079	9
263 080	12
263 081	9
263 082	27
263 083	9
263 084	8
263 085	22
263 089	8
263 090	2
263 091	28
263 092	32
263 097	4
263 098	14
263 099	4

NUMBER INDEX

Number	Page
ABMA DSP-TM-6-60	S-28
ABMA DV-TR-2-60	S-28
ACNP-6113	S-51
ACNP-6114	S-51
ACR-63, v. 1	S-43
AD-10 850	S-45
AD-71 054	S-67
AD-72 713	S-44
AD-102 836 (PB 158 140)	S-71
AD-109 046	S-66
AD-153 309	S-48
AD-162 540	S-18
AD-162 931	S-2
AD-203 398	S-31
AD-207 448	S-3
AD-207 501	S-10
AD-209 290	S-25
AD-210 397	S-74
AD-213 476	S-42
AD-216 197	S-20
AD-216 305	S-28
AD-217 531	S-18
AD-218 167	S-25
AD-219 437	S-35
AD-225 595	S-29
AD-225 630	S-19
AD-226 247	S-24
AD-266 449	S-35
AD-226 882	S-47
AD-226 947	S-9
AD-227 849	S-27
AD-228 404	S-19
AD-228 433	S-47
AD-228 482	S-63
AD-229 058	S-17
AD-229 277	S-27
AD-229 687	S-21
AD-230 955	S-41
AD-231 478	S-24
AD-231 793	S-25
AD-232 421	S-13
AD-232 898	S-58
AD-233 077	S-31
AD-233 208	S-5
AD-233 804	S-9
AD-234 134	S-30
AD-234 139	S-49
AD-234 143	S-24
AD-234 290	S-30
AD-234 315	S-42
AD-234 336	S-39
AD-234 442	S-70
AD-234 697	S-17
AD-234 983	S-62
AD-235 207	S-8
AD-235 320	S-56
AD-235 652	S-62
AD-235 663	S-26
AD-235 839	S-32
AD-236 167	S-74
AD-236 820	S-32
AD-237 536	S-32
AD-238 084	S-67
AD-239 047	S-9
AD-239 406	S-16
AD-240 280	S-72
AD-240 320	S-20
AD-240 570	S-31
AD-240 590	S-25
AD-240 655	S-48
AD-241 587	S-66
AD-243 246	S-15
AD-243 370	S-61
AD-243 551	S-15
AD-244 251	S-49
AD-244 605	S-41
AD-245 029	S-12
AD-245 146	S-3
AD-245 147	S-4
AD-245 391	S-12
AD-245 604	S-62
AD-245 653	S-27
AD-245 908	S-65
AD-245 920	S-41
AD-246 097	S-66
AD-246 098	S-60
AD-246 160	S-15
AD-246 167	S-72
AD-246 548	S-5
AD-246 551	S-42
AD-246 561	S-69
AD-246 602	S-43
AD-246 644	S-34
AD-246 717	S-75
AD-246 886	S-38
AD-247 197	S-10
AD-247 316	S-43
AD-247 323	S-32
AD-247 376	S-3
AD-247 476	S-74
AD-247 595	S-49
AD-248 047	S-21
AD-248 064	S-29
AD-248 075	S-14
AD-248 300	S-33
AD-248 352	S-40
AD-248 455	S-26
AD-248 457	S-47
AD-248 910	S-24
AD-248 964	S-40
AD-249 056	S-40
AD-249 065	S-25
AD-249 381	S-11
AD-249 550	S-12
AD-249 578	S-46
AD-249 718	S-29
AD-249 775	S-27
AD-249 931	S-23
AD-250 234	S-13
AD-250 242	S-68
AD-250 261	S-71
AD-250 287	S-22
AD-250 302	S-62
AD-250 474	S-41
AD-250 548	S-13
AD-250 685	S-68
AD-250 755	S-10
AD-250 888	S-38
AD-250 966	S-73
AD-250 998	S-3
AD-251 142	S-20
AD-251 148	S-4
AD-251 196	S-31
AD-251 245	S-21
AD-251 246	S-22
AD-251 325	S-19
AD-251 358	S-14
AD-251 359	S-14
AD-251 447	S-75
AD-251 481	S-76
AD-251 482	S-39
AD-251 507	S-23
AD-251 509	S-14
AD-251 510	S-75
AD-251 517	S-28
AD-251 570	S-4
AD-251 571	S-75
AD-251 572	S-23
AD-251 663	S-22
AD-251 669	S-33
AD-251 760	S-73
AD-251 810	S-34
AD-251 811	S-15
AD-251 846	S-5
AD-251 917	S-28
AD-251 939	S-58
AD-251 957	S-2
AD-251 959	S-51
AD-251 994	S-41
AD-252 043	S-22
AD-252 045	S-68
AD-252 046	S-63
AD-252 047	S-38
AD-252 058	S-30
AD-252 204	S-59
AD-252 205	S-61
AD-252 211	S-68
AD-252 285	S-4
AD-252 352	S-68
AD-252 478	S-59
AD-252 497	S-22
AD-252 498	S-75
AD-252 518	S-61
AD-252 542	S-28
AD-252 572	S-72
AD-252 589	S-44
AD-252 643	S-37
AD-252 877	S-69
AD-253 068	S-3
AD-253 102	S-2
AD-253 149	S-27
AD-253 399	S-71
AD-253 436	S-23
AD-253 439	S-66
AD-253 664	S-67
AD-253 665	S-19
AD-253 765	S-49
AD-253 778	S-37
AD-253 852	S-68
AD-253 975	S-17
AD-253 993	S-39
AD-254 063	S-6
AD-254 081	S-39
AD-254 594	S-65
AD-254 703	S-64
AD-254 899	S-38
AD-254 900	S-37
AD-254 906	S-59
AD-254 929	S-65
AD-254 936	S-44
AD-255 753 repriced	S-70
AD-256 001	S-18
AD-256 311	S-13
AD-256 629	S-67
AD-256 679	S-37
AD-256 690 repriced	S-66
AD-256 751 repriced	S-6
AD-256 178	S-57
AD-257 197	S-64
AD-257 333	S-20
AD-257 397	S-69
AD-258 049	S-13
AD-258 122	S-12
AD-258 229 repriced	S-8
AD-258 264	S-64
AD-258 574 repriced	S-34
AD-258 639	S-50
AD-258 754 repriced	S-30
AD-258 774	S-11
AD-259 060 repriced	S-7
AD-259 326 repriced	S-65
AD-259 343 repriced	S-2
AD-259 540 repriced	S-35
AD-259 547 repriced	S-26
AD-259 714 repriced	S-63
AD-259 880 repriced	S-21
AD-259 994 repriced	S-72
AD-260 024 repriced	S-60
AD-260 238	S-47
AD-260 345 repriced	S-36
AD-260 688	S-1
AD-261 593 repriced	S-20
AEPG-SIG-960-67	S-72
AEPG-SIG-970-37	S-50
AeroChem TP-7 (AD-258 229)	S-8
AeroChem TP-11, (AD-258 229)	S-8
AeroChem TP-12, (AD-258 229)	S-8
AeroChem TP-17, (AD-258 229)	S-8
AeroChem TP-24	S-8
AF 04(647)127	S-43
AFBMD-8-7061	S-43
AFBMD-8-8735	S-35
AFBMD-60-2094	S-41
AFBMD-61-04-5272	S-29
AFBMD-61-832-9	S-29
AFBMD-TR-61-54	S-8
AFCRL-122	S-63
AFCRL-192	S-6
AFCRL-329	S-26
AFCRL-369	S-7
AFCRL-430	S-21
AFFTC-TR-59-4	S-42
AFFTC-TR-60-27	S-15
AFFTC-TR-60-27, App. 3	S-15
AFOSR-97	S-69
AFOSR-263	S-42
AFOSR-475	S-76
AFOSR-554	S-36
AFOSR-786	S-11
AFOSR-TN-60-1343	S-44
AFOSR-TN-60-1445	S-69
AFSAM-60-7	S-5
AFSAM-61-8	S-6
AFSWC-TN-59-18	S-56
AFSWC-TR-59-56	S-17
AFSWC-TR-60-20	S-61
AIL-3928-1	S-17
AIL-8412-I-3	S-18
ALI C-59878-9	S-35
ALI SR-78	S-35
ANL-6278	S-50
ANL-6358	S-59
ANL-6369	S-70
ANL-6376	S-59
ANL-6381	S-16
APAE-83	S-47
APAE-87	S-51
APAE-M-286	S-51
APAE-M-288	S-37
APAE-M-291	S-51
APEX-601	S-38
APEX-604	S-60
APEX-605	S-38
APEX-607	S-38
APEX-623	S-45
APEX-634	S-60
APEX-637	S-6
APEX-649	S-46
APEX-650	S-60
APEX-657	S-70
APEX-658	S-38
APEX-668	S-71
APEX-699	S-6
APEX-737	S-33
APEX-748	S-50
ARA-870	S-27
ARF-1167-12	S-51
ARF-2200-12	S-8
ARF-E086	S-74
ARF-K150, FR	S-17
ARGMA TN 1HIN-9	S-70
ARINC-124-2-223, pt. 1	S-18
ARINC-124-2-223, pt. 2	S-18
ARL-TN-60-135	S-10
ARL-TN-60-156	S-71
ARL-TR-60-325	S-11
AROD-002N:2-E	S-31
AROD-223:53	S-19
AROD-223:54	S-38
AROD-431...	S-67
AROD-821:7	S-68
AROD-968:32	S-30
AROD-1256:13	S-71
AROD-1271:31	S-44
AROD-1517:28	S-37
AROD-1517:29	S-37
AROD-1534:2	S-16
AROD-1600:45-E	S-40
AROD-1600:48-E	S-40
AROD-1715:37	S-66
AROD-1773:1	S-65
AROD-1748:20	S-49
AROD-1922:4	S-68
AROD-1952:4	S-65
AROD-1952:5	S-64
AROD-1995:3	S-59
AROD-2099:4-P	S-59
AROD-2254:1	S-67
AROD-2776:5	S-39
AROD C-4:1-P	S-61
ASD-TR-61-166	S-1
ASI U-540	S-41
ASRL-1001	S-59
ATI-87 170	S-16
BAW-1223	S-59
BMI-1230	S-45
BMI-1537	S-45
BMI-1538	S-6
BMI-X-174	S-48
BMI-X-175	S-70
BNL-5441	S-5
BNL-5451	S-5
BNL-5617	S-19
BNL-5618	S-19
BNL-5619	S-19
BNL-5621	S-19
BNL-5622	S-50
BNL-5623	S-37
BRL-302	S-66
BRL-1121	S-28
BRL MR-759	S-42
BRL MR-1244	S-42

Number	Page
BRL MR-1312	S-51
BuPers TB-60-14	S-2
BuPers TB-60-15	S-2
CAL BB-1367-H-1	S-15
CAL HF-845-D-9	S-20
CAL-HF-1053-D-13	S-19
CBS CLD-1392	S-66
CCL-44	S-48
CEND-130	S-38
CF-55-3-159	S-48
CF-59-6-109	S-7
CF-60-1-54	S-46
CF-60-5-34	S-49
CF-60-8-15	S-56
CF-61-3-141	S-11
CF-61-4-69	S-46
CF-61-4-71	S-55
CF-61-5-54	S-39
CF-61-5-55	S-49
CF-61-5-109 (Suppl. 1)	S-50
CF-61-6-12	S-54
CF-61-6-16	S-71
CF-61-6-27	S-73
CF-61-6-58	S-55
CF-61-6-66	S-61
CF-61-6-67	S-55
CF-61-6-83	S-54
CF-61-6-85	S-58
CF-61-6-87	S-49
CF-61-6-93	S-54
CF-61-6-112	S-11
CF-61-7-3	S-58
CF-61-7-24	S-46
CF-61-7-54	S-55
CF-61-7-60	S-54
CF-61-7-82	S-55
CF-61-7-85	S-54
CF-61-7-87	S-55
CF-61-7-88	S-39
CF-61-8-29	S-54
CF-61-8-37	S-55
CIIR SI-Pub-282	S-9
CIT-85-17	S-62
CIT-ORD-6D-TR49	S-19
CIT-ORD-6D-TR50	S-38
COLL CER-957	S-19
CPS-9	S-13
CRDLR-3039	S-5
CRDLR-3057	S-3
CRDL SP-2-35	S-4
CVNA-85	S-48
CVNA-86	S-46
CVNA-87	S-48
DA 36-039-sc-70174	S-18
DINA	S-30
DLCS-1500301	S-52
DLCS-1560103	S-53
DLCS-2110140	S-52
DLCS-2110141	S-52
DLCS-2160105	S-53
DLCS-2250101	S-52
DLCS-2250102	S-52
DLCS-2390401	S-58
DLCS-2760201	S-56
DLCS-3200101	S-56
DLCS-3250101	S-56
DLCS-3330101	S-56
DLCS-3360101	S-52
DLCS-3370101	S-50
DLCS-3380101	S-50
DLCS-3550101	S-53
DLCS-3550201	S-53
DLCS-3550401	S-53
DLCS-3560105	S-57
DLCS-3590401	S-52
DLCS-3610101	S-52
DLCS-3630101	S-52
DOFL TR-896	S-20
DOFL TR-958	S-20
DP-329	S-6
DP-567	S-55
DP-584	S-50
DP-589	S-58
DP-598	S-55
DP-612	S-7
EES-910 160A	S-48
EP-143	S-13
FA MR-325	S-33
FAA Task 59-222, FR	S-43
FZK-110 (Suppl. 1)	S-55
FZK-9-148	S-32
GA-1803	S-38
GA-1896	S-45
GA-2144	S-49
GA-2314	S-45
GA-2379	S-34
GALCIT M-56	S-40
GALCIT M-59	S-40
GAMD-1027	S-49
GAMD-2033	S-9
GAT-T-947	S-16
GEAP-3256	S-53
GEAP-3389	S-53
GEAP-3609	S-45
GEAP-2623	S-45
GEAP-3782	S-40
GNEC-116	S-53
GNEC-144	S-53
GNEC-184	S-38
Grant DA-ORD-7, TR-5	S-39
Grant NSF G-4790	S-73
Grant NSF G-12142	S-63
HW-27400	S-7
HW-26780	S-16
HW-38210	S-53
HW-38759	S-31
HW-41884	S-53
HW-53004(Del.)	S-53
HW-56821	S-71
HW-59029	S-58
HW-60278	S-7
HW-61543	S-53
HW-61900 C	S-53
HW-62453	S-57
HW-62789	S-16
HW-62958	S-16
HW-63455	S-7
HW-63855	S-10
HW-65191	S-71
HW-66227	S-53
HW-66539	S-53
HW-66693	S-45
HW-6681	S-57
HW-66864 (Rev.)	S-16
HW-67830	S-10
HW-68023	S-57
HW-68116	S-57
HW-68533	S-5
HW-68636	S-16
HW-68931	S-16
HW-69533	S-57
HW-69758	S-14
HW-69789	S-57
HW-70084	S-53
HW-70085	S-31
HW-70199	S-7
HW-70294	S-53
HW-70706	S-57
HW-SA-1983	S-54
HW-SA-2053	S-58
HW-SA-2140	S-50
HW-SA-2143	S-53
HW-SA-2156	S-53
HW-SA-2171	S-57
HW-SA-2195	S-7
HW-SA-2199	S-38
HW-SA-2204	S-10
HW-SA-2205	S-7
HW-SA-2206	S-5
HW-SA-2207	S-57
HW-SA-2208	S-7
HW-SA-2209	S-64
HW-SA-2210	S-7
IDO-14556	S-7
IDO-16644	S-39
IDO-19029	S-52
IER-4-12	S-16
IER-60-339	S-63
IER-73-2	S-68
ILU DCL-102	S-20
Kaman-58-92-PR-25	S-49
Kennedy TP-319	S-21
KLX-10166	S-27
L-238	S-15
LA-2527	S-61
LA-2569	S-5
LA-2584	S-35
LAMS-2522	S-39
LAMS-2536	S-61
LAMS-2538	S-54
LAMS-2539	S-54
LAMS-2541	S-54
LL-4G-0010	S-22
LL-21G-0013	S-22
LL-22G-0055	S-38
LL-25-G-0021, rev. 1	S-75
LL-25G-0024	S-75
LL-25G-0025	S-75
LL-25G-0028	S-75
LL-32-25	S-74
LL-33G-0015	S-72
LL-34G-0008	S-22
LL-46G-0010	S-21
LL-47G-0016	S-22
LL-51-10	S-63
LL-58G-0018	S-4
LL-82G-0025	S-22
LL-312G-0001	S-29
LL-760-0002	S-59
LMSD-49-703	S-29
LMSD-703 052	S-61
LMSD-703 073	S-38
LMSD-704026	S-29
LMSD-895 013	S-73
LMSD-895 025	S-38
LMSD-895 043	S-68
LMSD-895 049	S-68
LMSD-895 050	S-68
LMSD-703 087	S-61
LMSD-703 087	S-42
Lock NR-104	S-29
Lock SB-60-3	S-48
Lock SB-60-28, pt. 2	S-23
Lock SB-60-40, pt. 2	S-14
Lock SB-60-40, pt. 3	S-14
Lock SB-60-40, pt. 4	S-14
Lock SRB-60-7	S-12
Lock SRB-60-12	S-23
MEDEW-RS-3-60	S-4
MIT-1113(Del)	S-45
MLNYNS-5990-1, PR-1	S-36
MLNYNS-5990-1, PR-2	S-37
MND-P-2352	S-61
MND-P-3014-II	S-54
MSD-217-950	S-61
MSEE-61-10	S-23
MSRP-DP-76	S-39
MSRP RR-68	S-76
NAA-SR-6253	S-6
NAA-SR-M-2805	S-51
NAA-SR-M-3228	S-51
NAA-SR-M-3552	S-51
NAA-SR-M-4546	S-51
NAA-SR-M-5084	S-51
NAA-SR-M-5775	S-51
NAA-SR-M-6107	S-48
NAA-SR-M-6108	S-45
NAA-SR-M-6239	S-51
NAA-SR-M-6270	S-51
NAA-SR-M-6284	S-18
NAA-SR-M-6285	S-51
NAA-SR-M-6296	S-51
NAA-SR-M-6374	S-51
NAA-SR-M-6411	S-70
NAA-SR-M-6414	S-10
NARF-60-13T	S-32
NAVSANDA ER-2.50602	S-47
NAVSHIPS-900, 195	S-20
NAVTRADEVCEN-565-1	S-3
NAVTRADEVCEN-661-1	S-72
NAVWEPS-2017	S-45
NAVWEPS-3478	S-31
NAVWEPS-6034	S-2
NAVWEPS-6087	S-30
NAVWEPS-6154	S-49
NAVWEPS-6548	S-31
NAVWEPS-6690	S-24
NAVWEPS-6710	S-24
NAVWEPS-6739	S-41
NAVWEPS-6746	S-62
NAVWEPS-6747	S-62
NAVWEPS-6759	S-30
NAVWEPS-6767	S-30
NAVWEPS-6771	S-24
NAVWEPS-6775	S-39
NBS TN-110	S-11
NBS TN-112	S-73
NCEL-N-383	S-57
NCEL-N-405	S-17
NDA-2131-40	S-55
NDA-2164-2	S-54
NEL-669	S-66
NLCO-785(Del)	S-17
NMI-1238	S-47
NMI-7201	S-54
NMI-7237	S-54
NMI-7239	S-54
NOL MDM-7	S-41
NOL MDM-9	S-39
NOTS-670	S-45
NOTS-1090	S-31
NOTS TP-2247	S-31
NUMEC-P-31	S-71
NYO-2963	S-61
NYO-2965	S-61
NYO-8770	S-6
NYO-9647	S-70
NYO-9664	S-55
NYO-9694	S-11
NYO-9744	S-56
NYO-9748	S-70
ORD-832, SR-1	S-29
ORNL-1154(Del.)	S-33
ORNL-3148	S-39
ORO-144(Del.)	S-55
ORO-414	S-17
ORO-415	S-6
ORO-421	S-7
ORO-422	S-8
ORO-423	S-8
ORO-424	S-8
ORO-426	S-8
ORO-427	S-8
ORO-428	S-8
ORO-429	S-8
ORO-430	S-8
ORO-431	S-8
ORO-432	S-8
ORO-439	S-7
ORO-443	S-33
ORO-448	S-33
ORO-460	S-52
ORO-463	S-54
ORO-464	S-64
OSURF-656-1	S-65
OSURF-662-29	S-18
OSURF-896-5	S-67
OTS CTR-298, suppl.	S-24
OTS CTR-371, suppl.	S-40
OTS SB-471	S-24
OTS SB-472	
OTS SB-473	
PA DB-TR: 2-60	
PA DB-TR: 7-	
PA ORDBB-TR	
PB 143 541 see	
PB 150 976	
PB 150 977	
PB 150 978	
PB 150 979	S-27
PB 150 980	S-21
PB 152 510	S-25
PB 152 692	S-48
PB 153 108-1	S-75
PB 153 222	S-44
PB 153 436	S-66
PB 153 789	S-48
PB 154 076	S-69
PB 154 186	S-10
PB 154 195	S-73
PB 154 200	S-12
PB 154 211	S-25
PB 154 239	S-33
PB 154 256	S-29
PB 154 283	S-12
PB 154 301	S-22
PB 154 389	S-18
PB 154 490	S-19
PB 154 584	S-41
PB 154 736	S-69
PB 154 737	S-22
PB 154 785	S-21
PB 154 827	S-33
PB 154 853	S-75
PB 154 854	S-75
PB 154 893	S-38
PB 154 895	S-42
PB 154 928	S-22
PB 154 929	S-4
PB 154 930	S-75
PB 154 972	S-3
PB 154 978	S-51
PB 154 979	S-22
PB 154 980	S-28
PB 155 021	S-21
PB 155 023	S-24
PB 155 031	S-13
PB 155 032	S-25
PB 155 036	S-63
PB 155 038	S-2
PB 155 042	S-38
PB 155 043	S-63
PB 155 049	S-13
PB 155 112	S-59
PB 155 121	S-3
PB 155 133	S-4

Number	Page
PB 155 178	S-28
PB 155 180	S-31
PB 155 184 see PB 153 108-1	S-75
PB 155 185	S-22
PB 155 192	S-28
PB 155 200	S-72
PB 155 245	S-12
PB 155 280	S-44
PB 155 336	S-17
PB 155 337	S-2
PB 155 350	S-12
PB 155 370	S-67
PB 155 442	S-29
PB 155 495	S-68
PB 155 498	S-40
PB 155 501	S-40
PB 155 550	S-42
PB 155 555	S-76
PB 155 676	S-6
PB 155 736	S-35
PB 155 738	S-23
PB 155 758	S-69
PB 156 058	S-61
PB 156 059	S-31
PB 156 061	S-19
PB 156 062	S-38
PB 156 063	S-30
PB 156 065	S-71
PB 156 066	S-44
PB 156 067	S-37
PB 156 070	S-65
PB 156 071	S-49
PB 156 072	S-68
PB 156 074	S-65
PB 156 075	S-64
PB 156 076	S-59
PB 156 077	S-59
PB 156 079	S-67
PB 156 082	S-39
PB 156 198	S-32
PB 156 214 see PB 171 989	S-19
PB 156 240	S-61
PB 156 241	S-73
PB 156 242	S-68
PB 156 244	S-38
PB 156 247	S-23
PB 156 250	S-68
PB 156 265	S-23
PB 156 266	S-14
PB 156 267	S-14
PB 156 268	S-14
PB 156 288	S-15
PB 156 363	S-5
PB 156 381 see AD-256 751	S-6
PB 156 460	S-9
PB 156 548	S-23
PB 156 574	S-41
PB 156 617 see AD-258 049	S-13
PB 156 629	S-25
PB 156 702	S-68
PB 156 712	S-37
PB 156 804 see AD-258 122	S-12
PB 156 812 see AD-258 774	S-11
PB 156 827	S-1
PB 156 828	S-1
PB 156 829	S-41
PB 156 861	S-65
PB 156 870	S-41
PB 156 899-1	S-25
PB 156 899-2	S-25
PB 156 900	S-26
PB 156 908	S-4
PB 156 992	S-20
PB 156 995	S-47
PB 156 996	S-47
PB 157 104	S-26
PB 157 137	S-44
PB 157 152 see AD-259 714	S-63
PB 157 160 see AD-259 547	S-26
PB 157 187 see AD-259 880	S-21
PB 157 291 see AD-256 311	S-13
PB 157 340	S-75
PB 157 346	S-61
PB 157 358 see PB 181 034	S-72
PB 157 391	S-43
PB 157 392	S-43
PB 157 399	S-62
PB 157 420	S-44
PB 157 483	S-72
PB 157 487	S-60
PB 157 488	S-66
PB 157 493	S-3
PB 157 494	S-4
PB 157 496	S-66
PB 157 510 see AD-260 345	S-36
PB 157 511 see AD-259 060	S-7
PB 157 531	S-40
PB 157 534	S-47
PB 157 538	S-14
PB 157 541 see PB 171 993	S-20
PB 157 582 see AD-256 679	S-37
PB 157 583 see AD-258 122	S-12
PB 171 587 see AD-259 994	S-72
PB 157 592 see AD-257 178	S-57
PB 157 595 see AD-256 690	S-66
PB 157 610	S-27
PB 157 633	S-72
PB 157 695	S-30
PB 157 696	S-70
PB 157 698	S-56
PB 157 699	S-17
PB 157 700	S-62
PB 157 701	S-24
PB 157 702 see PB 171 988	S-49
PB 157 703	S-30
PB 157 704	S-24
PB 157 705	S-39
PB 157 707	S-41
PB 157 708	S-5
PB 157 711	S-42
PB 157 715	S-62
PB 157 716	S-31
PB 157 718	S-2
PB 157 722	S-19
PB 157 723	S-18
PB 157 733	S-29
PB 157 735	S-32
PB 157 737	S-3
PB 157 738	S-9
PB 157 742	S-42
PB 157 743	S-24
PB 157 767 see AD-257 397	S-69
PB 157 871	S-10
PB 157 872	S-11
PB 157 879	S-42
PB 157 900	S-46
PB 157 927 see AD-259 540	S-35
PB 157 928 see AD-260 238	S-47
PB 157 955 see AD-258 229	S-8
PB 157 974 see AD-258 049	S-13
PB 157 978 see AD-256 001	S-18
PB 157 979 see AD-256 629	S-67
PB 157 980 see AD-258 264	S-64
PB 157 994 see AD-261 593	S-20
PB 158 022	S-10
PB 158 023	S-26
PB 158 030 see PB 171 991	S-5
PB 158 034	S-76
PB 158 035	S-39
PB 158 061	S-13
PB 158 066	S-3
PB 158 067	S-74
PB 158 074 see PB 171 990	S-62
PB 158 078	S-37
PB 158 095 see PB 171 994	S-32
PB 158 108 see PB 171 992	S-68
PB 158 110	S-69
PB 158 111 see PB 158 078	S-37
PB 158 130-1	S-36
PB 158 130-2	S-37
PB 158 131	S-61
PB 158 132	S-58
PB 158 133	S-28
PB 158 134	S-74
PB 158 135	S-28
PB 158 137	S-33
PB 158 138	S-43
PB 158 139	S-9
PB 158 140	S-71
PB 158 141	S-48
PB 158 142	S-17
PB 158 143	S-29
PB 158 144	S-45
PB 158 145	S-34
PB 158 165	S-74
PB 158 191	S-45
PB 158 289	S-20
PB 158 290	S-57
PB 158 292	S-29
PB 158 301	S-28
PB 158 302	S-27
PB 158 303	S-32
PB 158 304	S-67
PB 158 314	S-66
PB 158 315-1	S-15
PB 158 315-2	S-15
PB 158 318	S-8
PB 158 319	S-49
PB 158 320	S-16
PB 158 321	S-35
PB 158 322	S-41
PB 158 323	S-66
PB 158 324-1	S-18
PB 158 324-2	S-18
PB 158 328	S-31
PB 158 335	S-16
PB 161 611	S-11
PB 161 613	S-73
PB 171 323	S-76
PB 171 978	S-43
PB 171 981	S-37
PB 171 982	S-58
PB 171 983	S-27
PB 171 984	S-73
PB 171 985	S-15
PB 171 986	S-34
PB 171 987	S-31
PB 171 988	S-49
PB 171 989	S-19
PB 171 990	S-62
PB 171 991	S-5
PB 171 992	S-68
PB 171 993	S-20
PB 171 994	S-32
PB 171 995	S-59
PB 171 996	S-21
PB 171 997	S-36
PB 171 998	S-15
PB 181 025	S-46
PB 181 026	S-34
PB 181 027	S-75
PB 181 028	S-35
PB 181 029	S-36
PB 181 030	S-1
PB 181 031	S-43
PB 181 032	S-71
PB 181 033 see AD-260 238	S-47
PB 181 034	S-72
Philco-R109-DF	S-25
Philips TR-136	S-35
PIBAL-561	S-43
PIBAL-565	S-41
PIBAL-575	S-41
PIBAL-617	S-43
Polarad-3120-FR	S-25
POLYRDC-4.19	S-25
PPL TR-60-7	S-69
PSNS-ML-E-379-3	S-33
PWA-1921	S-71
QMFCIAF A-323	S-32
QMFCIAF V-338	S-31
QREC CP-17	S-33
RADC-TN-59-381	S-25
RADC-TN-60-192	S-34
RADC-TR-59-19	S-74
RADC-TR-59-163	S-17
RADC-TR-59-165	S-27
RADC-TR-59-176	S-63
RADC-TR-59-194	S-27
RADC-TR-59-207	S-21
RIAL-61-2132	S-35
RM-2996-AEC	S-55
SAFHL M-35	S-44
SC-4544(RR)	S-43
SCNC-329	S-46
SCR-264	S-31
SCR-409	S-26
SCR-615-B	S-57
SCTM-11-61-81	S-14
SCTM-125-61(72)	S-26
SCTM-136-60(14)	S-15
SCTM-316-59(16)	S-46
Sperry NA-8240-8184-4	S-34
SRI-2853, TR-1	S-61
SRI-3049	S-26
SRO-60	S-55
SRO-53	S-55
SSC-121	S-32
STL/GM-TR-0127-00419	S-43
TID-11696	S-52
TID-12564	S-54
TID-12574	S-70
TID-12685	S-50
TID-12710	S-52
TID-12784	S-52
TID-12785	S-52
TID-12786	S-52
TID-12795	S-50
TID-12803	S-56
TID-12804	S-52
TID-12805	S-56
TID-12824	S-71
TID-12825	S-54
TID-12826	S-56
TID-12829	S-14
TID-12844	S-60
TID-12858	S-49
TID-12874	S-14
TID-12875	S-56
TID-12882	S-52
TID-12884	S-58
TID-12898	S-11
TID-12906	S-4
TID-12946	S-4
TID-12948	S-45
TID-12988	S-33
TID-12998	S-10
TID-13047	S-66
TID-13088	S-70
TID-13103	S-21
TID-13122	S-49
TID-13126	S-14
TID-13156	S-50
TID-13165	S-48
TID-13166	S-6
TID-13167	S-6
TID-13182	S-50
TID-13187	S-71
TID-13188	S-11
TID-13189	S-56
TID-13192	S-72
TID-13193	S-67
TID-13197	S-58
TID-13215	S-5
TID-13218	S-5
TID-13219	S-50
TID-13220	S-70
TID-13222	S-71
TID-13223	S-7
TID-13302	S-11
TID-13312	S-52
TID-13337	S-11
TID-13339	S-46
TID-13344	S-56
TID-13345	S-10
TID-13359	S-19
TID-13375	S-34
TID-13393	S-5
TID-13425	S-16
TID-13426	S-12
TID-13490	S-56
TID-13491	S-50
TID-13493	S-10
TID-13494	S-58
TNT	S-30
TREC-61-5	S-75
TSR-117	S-36
UCLA DE-60-73	S-1
UCLA DE-60-75	S-1
UCRL-5157 (Rev.)	S-60
UCRL-5705(Suppl. 1)	S-46
UCRL-6278-T(Rev.)	S-55
UCRL-6292-T	S-50
UCRL-6372	S-11
UCRL-6502-T	S-34
UCRL-6509	S-16
UCRL-9612	S-69
UCRL-9747	S-60
UCRL-13008	S-14
UCRL-13013	S-60
UMRI-2722	S-73
UMRI-2755-6-T	S-73
UMRI-2794	S-73
UNM-TR-EE-52	S-24
USBM-U-839	S-45
USNRDL AD-159(H)	S-17
USNRDL TR-359	S-58
USNRDL-TR-478	S-49
USNRDL-TR-484	S-46
WADC-TN-58-281	S-31
WADC-TR-57-649, pt. 3	S-15
WADC-TR-59-287	S-28
WADC-TR-59-510, pt. 2	S-65
WADC-TR-59-744, pt. 5	S-34
WADD-TR-59-661	S-37
WADD-TR-60-179	S-34
WADD-TR-60-285	S-73
WADD-TR-60-450	S-46
WADD TR-60-470, pt. 1	S-5
WADD TR-60-572	S-27
WADD-TR-60-627	S-27
WADD-TR-60-631	S-58
WADD-TR-60-535	S-2
WADD-TR-60-580, pt. 1	S-60
WADD-TR-60-650	S-70

Number	Page	Number	Page	Number	Page	Number	Page
WADD TR-60-670, pt. 1	S-36	WADD-TR-60-825	S-34	WCAP-1433	S-55	WT-811(Del)	S-56
WADD TR-60-679	S-21	WADD-TR-60-891	S-41	WIS-AF-2 see PB 158 140	S-71	YAEC-136	S-55
WADD-TR-60-809	S-59	WAPD-PWR-TE-83	S-62				

U. S. DEPARTMENT OF COMMERCE FIELD OFFICES

SERVE THE BUSINESS COMMUNITY

The Department of Commerce maintains Field Offices to enable the business community to avail itself locally of Government facilities designed to promote commerce. Working closely with various units in the Department and, when necessary, with other Government agencies, the Field Offices provide business services to manufacturers, wholesalers, retailers, trade publications, trade associations, advertising agencies, research groups, financial institutions, and exporters and importers.

Experienced personnel will gladly assist in the solution of specific problems, explain the scope and meaning of regulations administered by the Department, and provide practical assistance in the broad field of domestic and foreign commerce. Field offices act as official sales agents of the Superintendent of Documents, and maintain an extensive business reference library containing periodicals, directories, publications and reports from official as well as private sources.

Among the many services which businessmen have found of value are:

GENERAL

- Management and business aids
- Establishing a new business

BASIC ECONOMIC DATA

- Census data, with national and often State and regional breakdowns, on manufacturing, wholesaling, retailing, service industries, employment and unemployment, population, housing, agriculture
- Basic records of national income and product, regional trends, balance of payments, foreign aid

MARKETING AND DISTRIBUTION

- Development and maintenance of markets
- Distribution channels, facilities and services
- Marketing and distribution statistics

PRODUCTION

- Modernization of plant processes and other technological aids
- Development of new products
- Government-owned patents for free license
- Commodity standards

FOREIGN TRADE AND INVESTMENT

- Tariff and exchange regulations
- Import and export quotas, licensing regulations
- Statistics on imports and exports
- Investment and trade opportunities abroad
- Economic conditions in foreign countries

COOPERATIVE OFFICES

To make the services of the Department of Commerce more widely available, agreements have been entered into with more than 750 Chambers of Commerce, Manufacturers Associations, and similar business groups under which these organizations have become official Cooperative Offices of the Department. If specific information is not on hand in the Cooperative Office, your problem will be referred to the nearest Departmental field office.

Department Field Offices

ALBUQUERQUE, N. MEX., U.S. Courthouse.
ATLANTA 3, GA., 604 Volunteer Bldg.
BOSTON 10, MASS., Room 230, 80 Federal St.
BUFFALO 3, N.Y., 504 Federal Bldg.
CHARLESTON 4, S.C., Area 2, Sergeant Jasper Bldg., West End Broad St.
CHEYENNE, WYO., 207 Majestic Bldg.
CHICAGO 6, ILL., Room 1302, 226 W. Jackson Blvd.
CINCINNATI 2, OHIO, 809 Fifth Third Bank Bldg.
CLEVELAND 1, OHIO, Federal Reserve Bank Bldg.
DALLAS 1, TEX., Room 3–104 Merchandise Mart.
DENVER 2, COLO., 142 New Customhouse.
DETROIT 26, MICH., 438 Federal Bldg.
GREENSBORO, N.C., 407 U.S. Post Office Bldg.
HOUSTON 2, TEX., 610 Scanlan Bldg.
JACKSONVILLE 1, FLA., 425 Federal Bldg.
KANSAS CITY 6, MO., Room 2011, 911 Walnut St.
LOS ANGELES 15, CALIF., Room 450, 1031 S. Broadway.
MEMPHIS 3, TENN., 212 Falls Bldg.
MIAMI 32, FLA., 408 Ainsley Bldg.
MINNEAPOLIS 1, MINN., 304 Federal Bldg.
NEW ORLEANS 12, LA., 333 St. Charles Ave.
NEW YORK 1, N.Y., Empire State Bldg.
PHILADELPHIA 7, PA., Jefferson Bldg.
PHOENIX, ARIZ., 137 N. Second Ave.
PITTSBURGH 22, PA., 107 Sixth St.
PORTLAND 4, OREG., 217 Old U.S. Courthouse and P.O. Bldg.
RENO, NEV., 1479 Wells Ave.
RICHMOND 19, VA., 309 Parcel Post Bldg.
ST. LOUIS 1, MO., 910 New Federal Bldg.
SALT LAKE CITY 1, UTAH, 222 SW. Temple St.
SAN FRANCISCO 11, CALIF., Room 419 Customhouse.
SAVANNAH, GA., 235 U.S. Courthouse and P.O. Bldg.
SEATTLE 4, WASH., 809 Federal Office Bldg.

For local telephone listing, consult section devoted to U.S. Government

UNITED STATES
GOVERNMENT PRINTING OFFICE
DIVISION OF PUBLIC DOCUMENTS
WASHINGTON 25, D. C.

OFFICIAL BUSINESS

PENALTY FOR PRIVATE USE TO AVOID
PAYMENT OF POSTAGE, $300